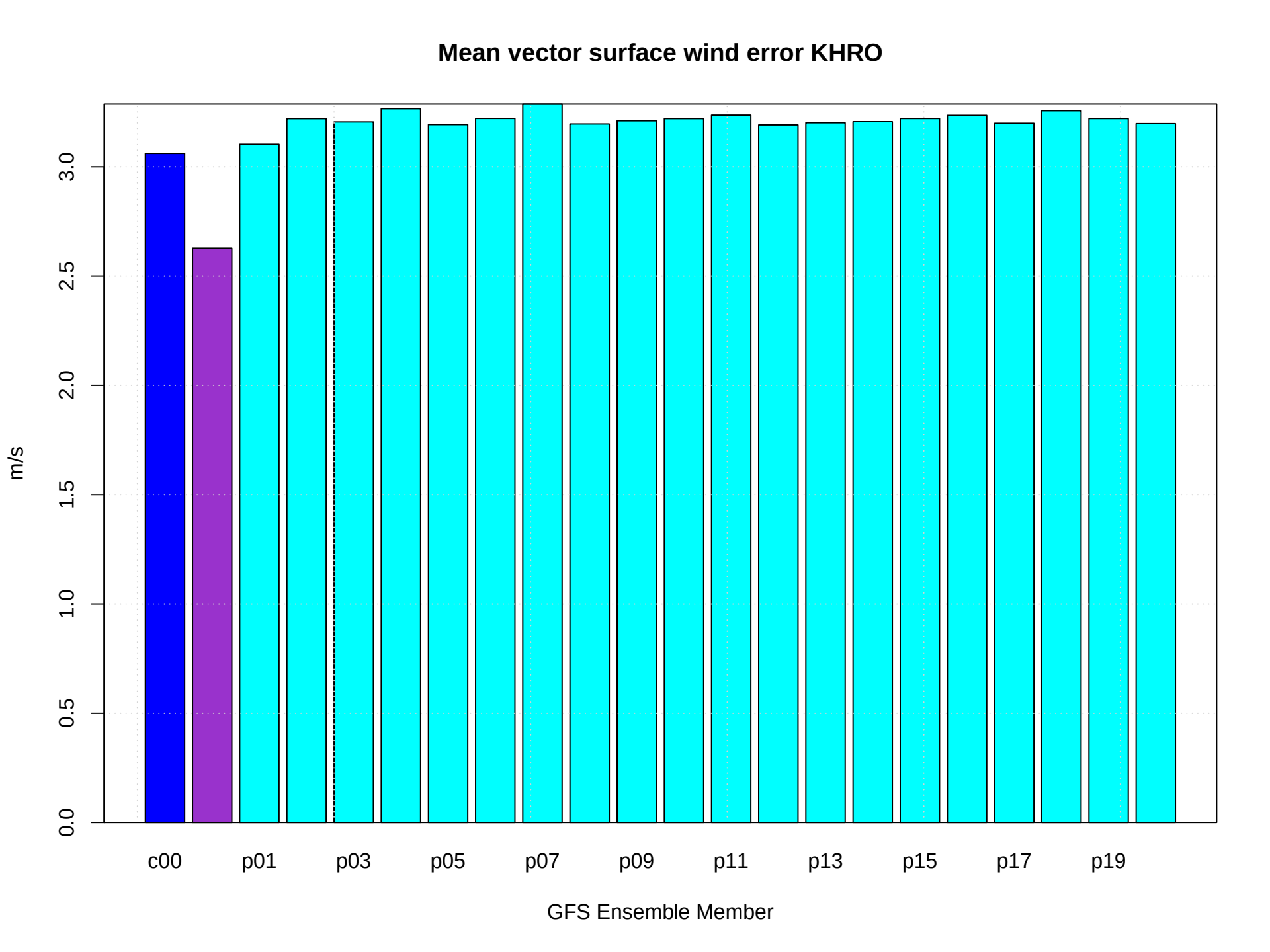
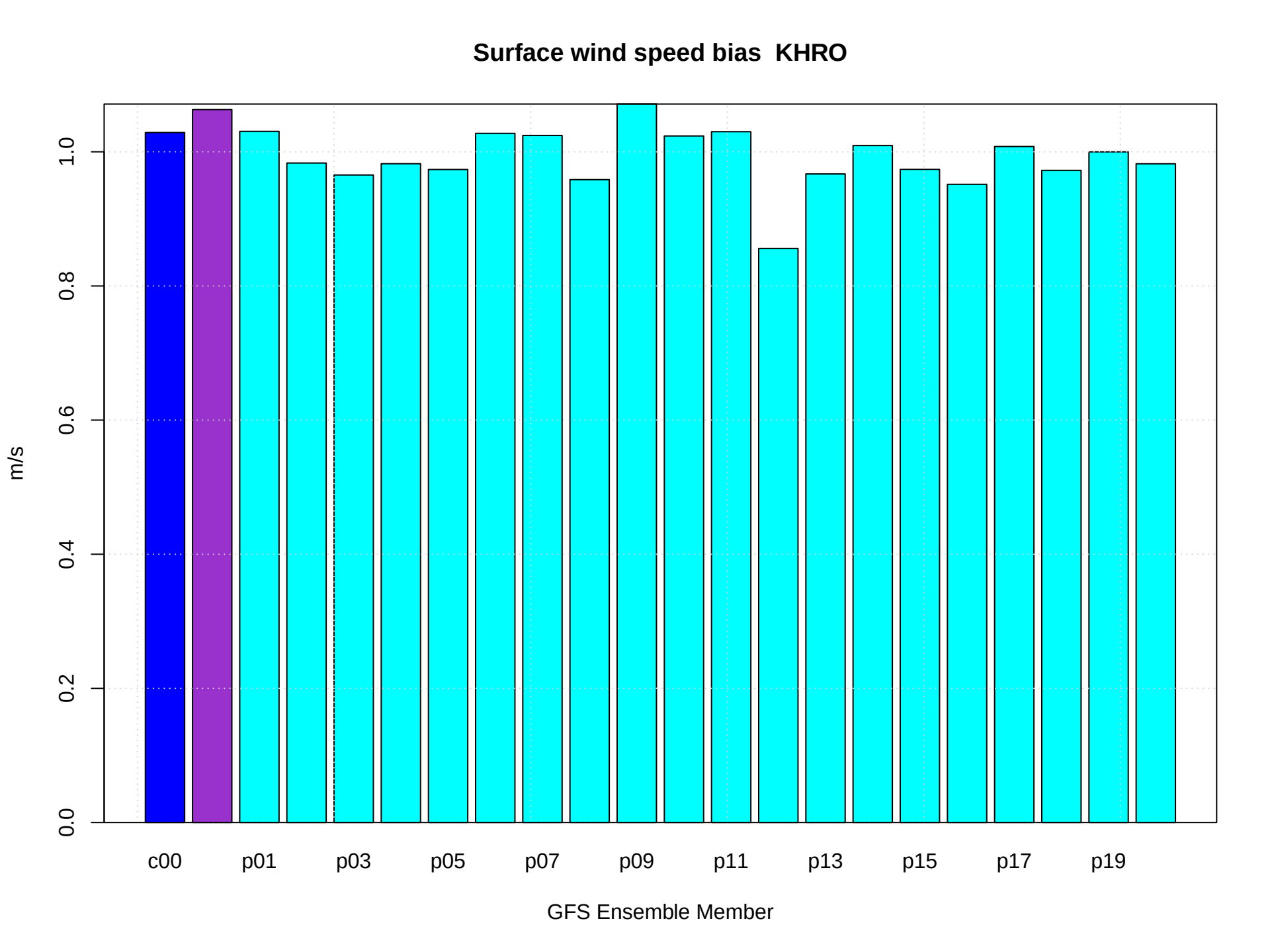
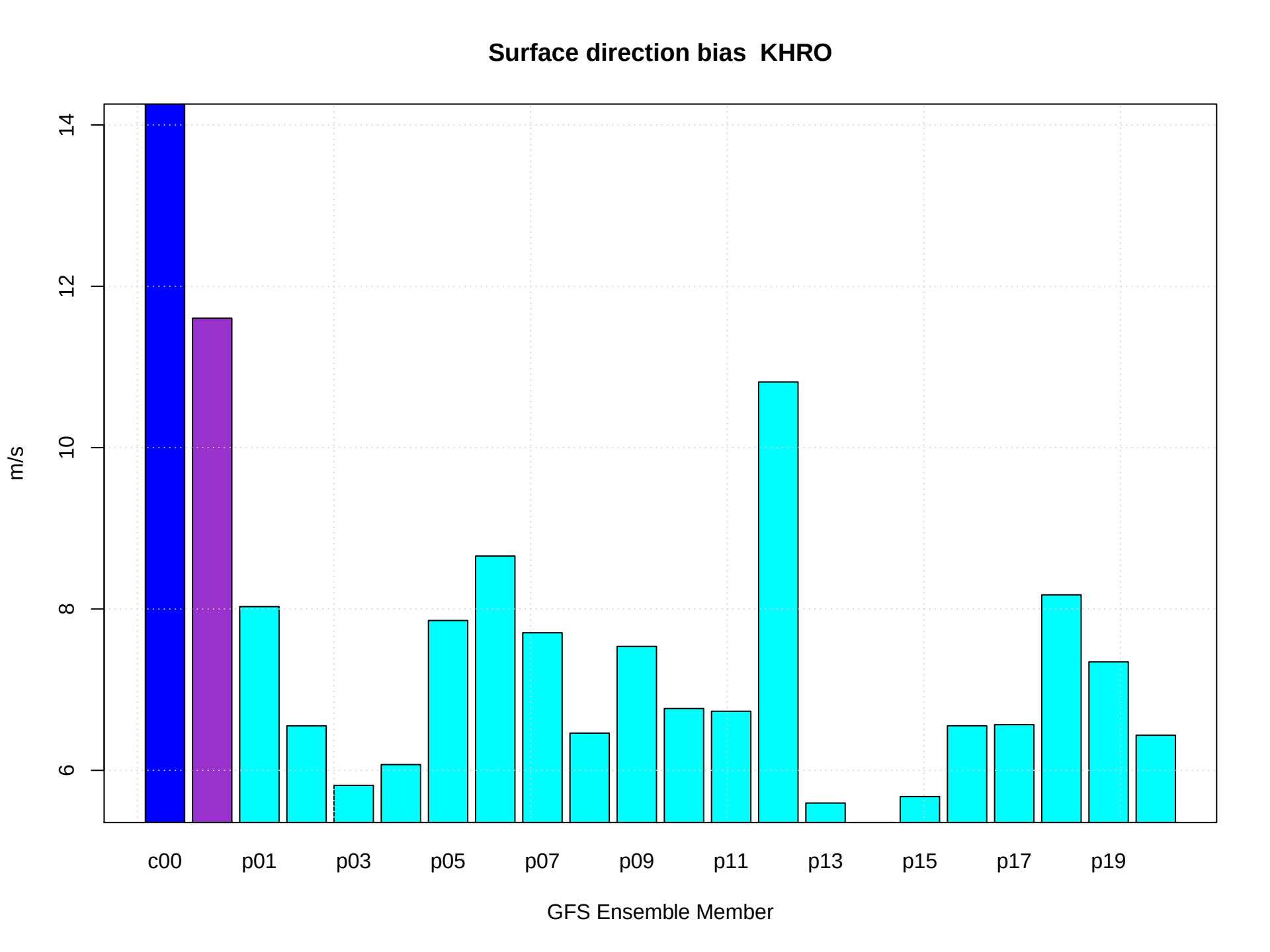
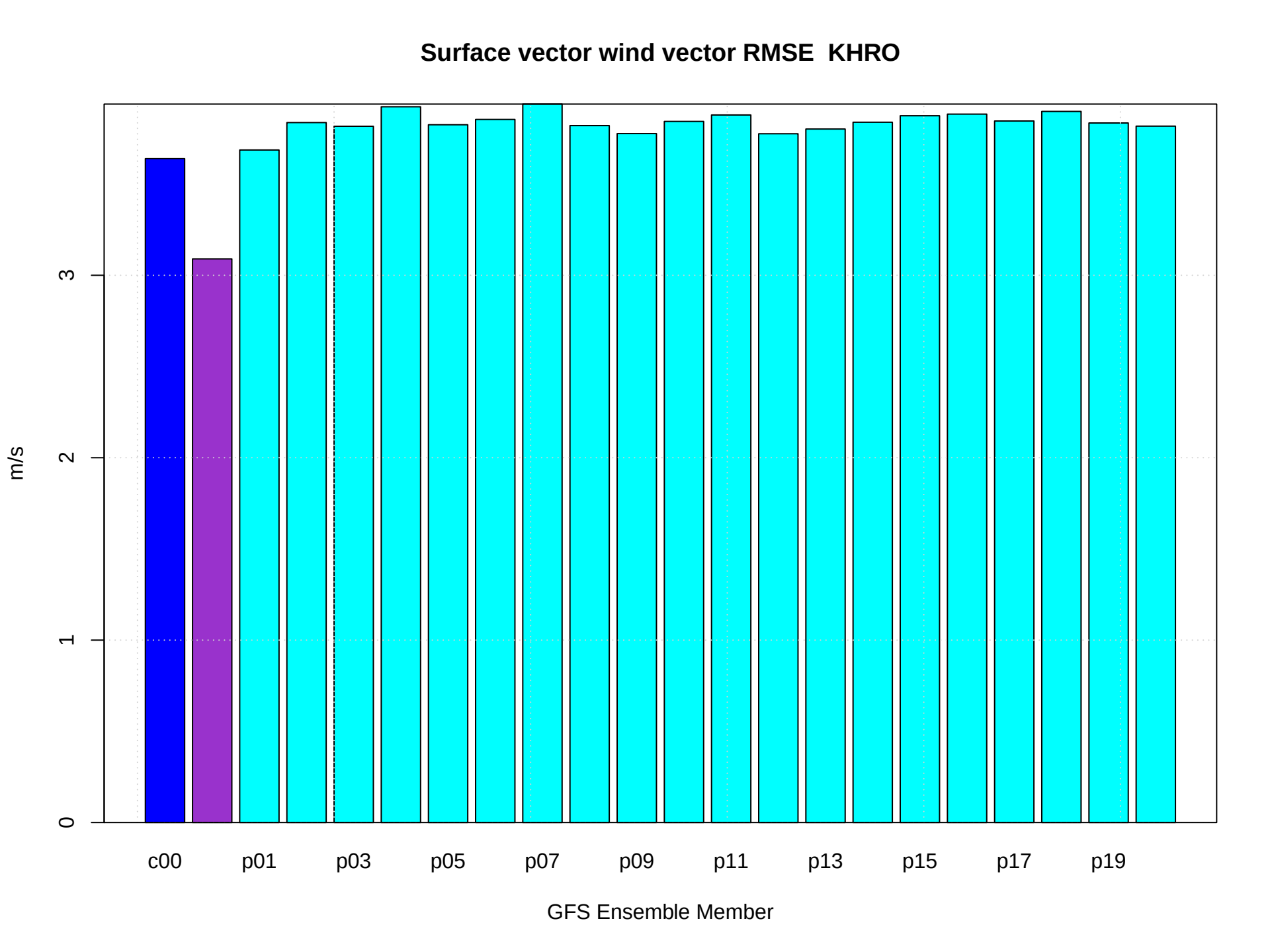
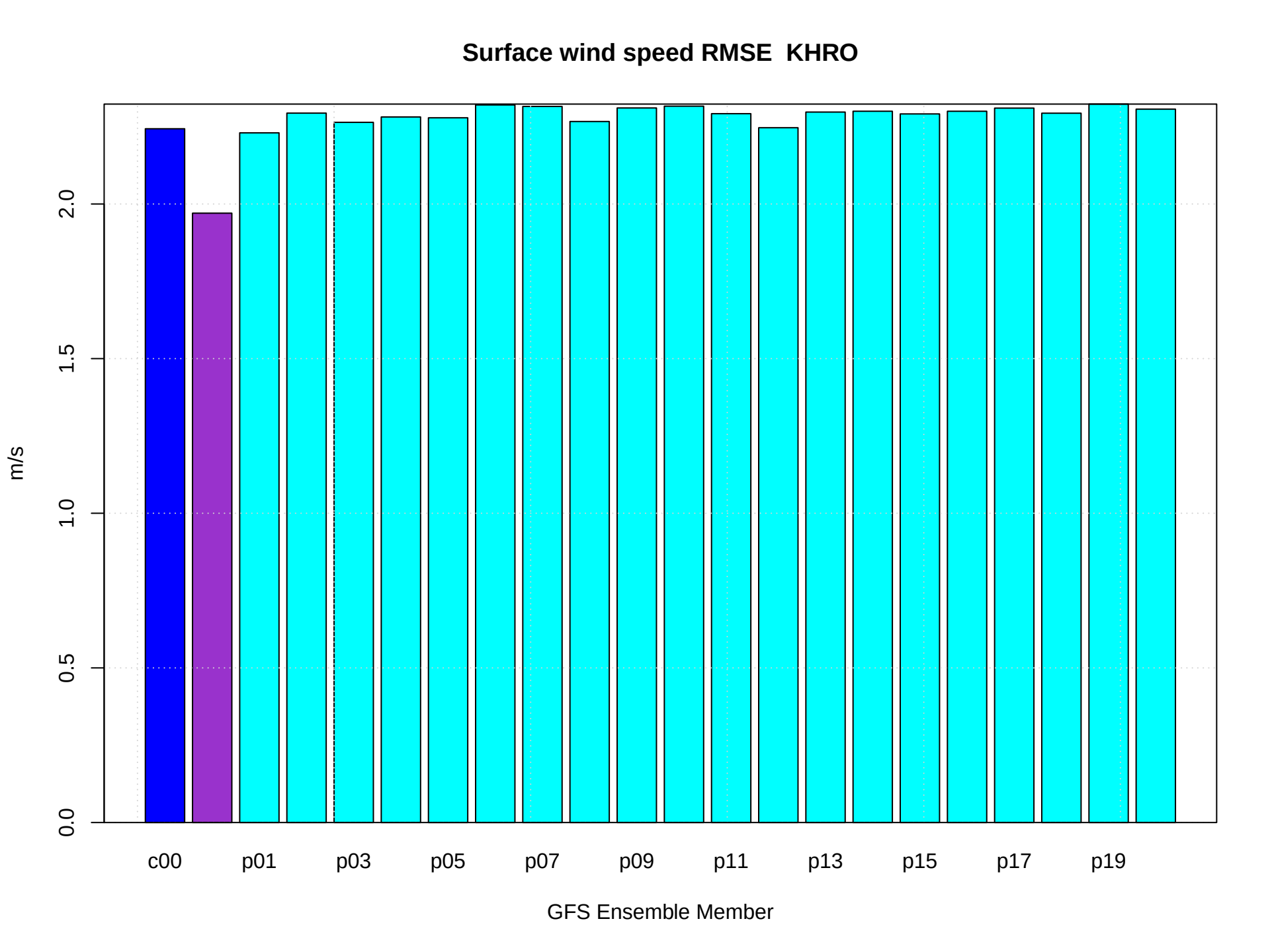
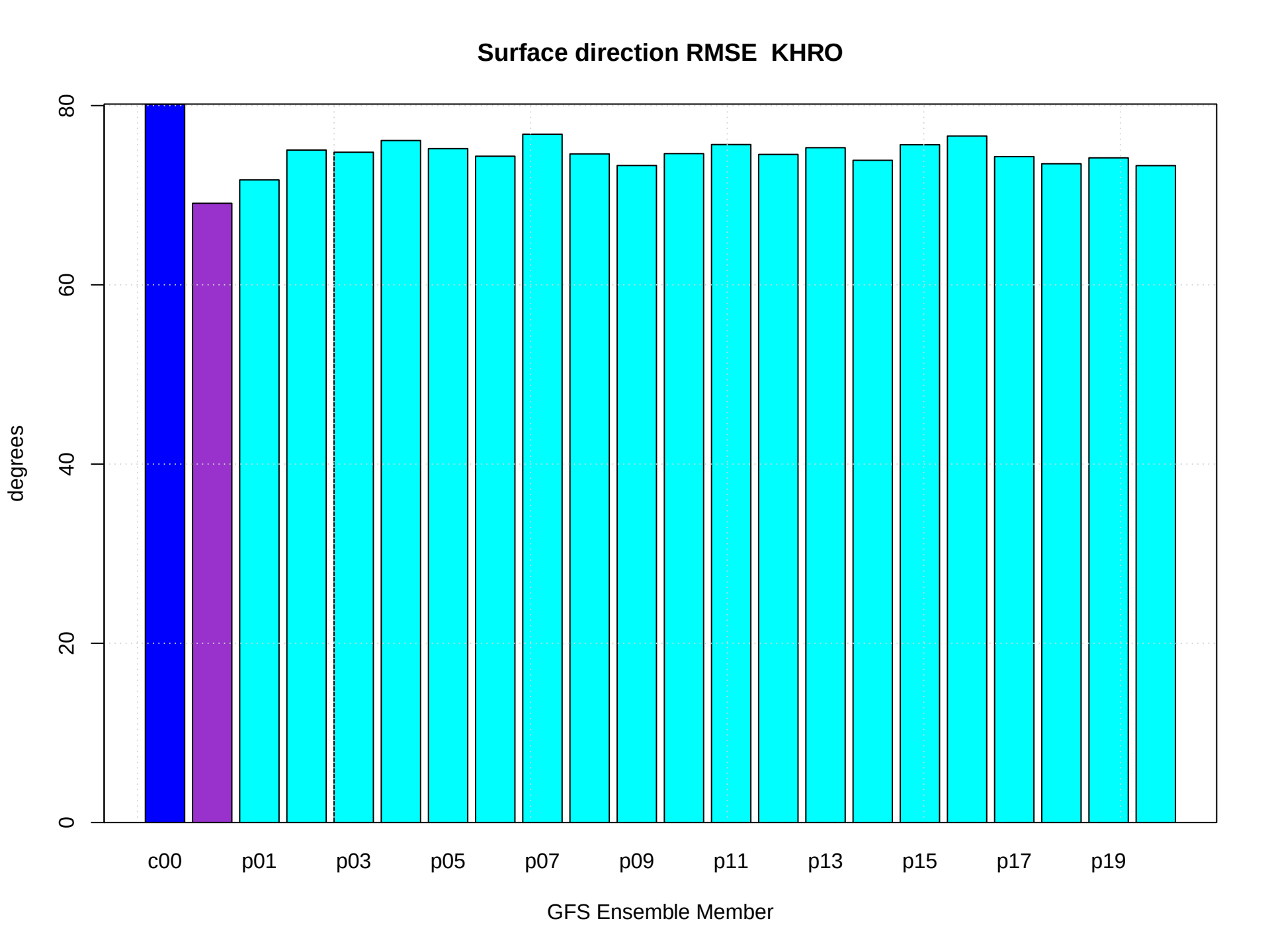

Mean vector surface wind error KHRO
m/s
0.0
0.5
1.0
1.5
2.0
2.5
3.0
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

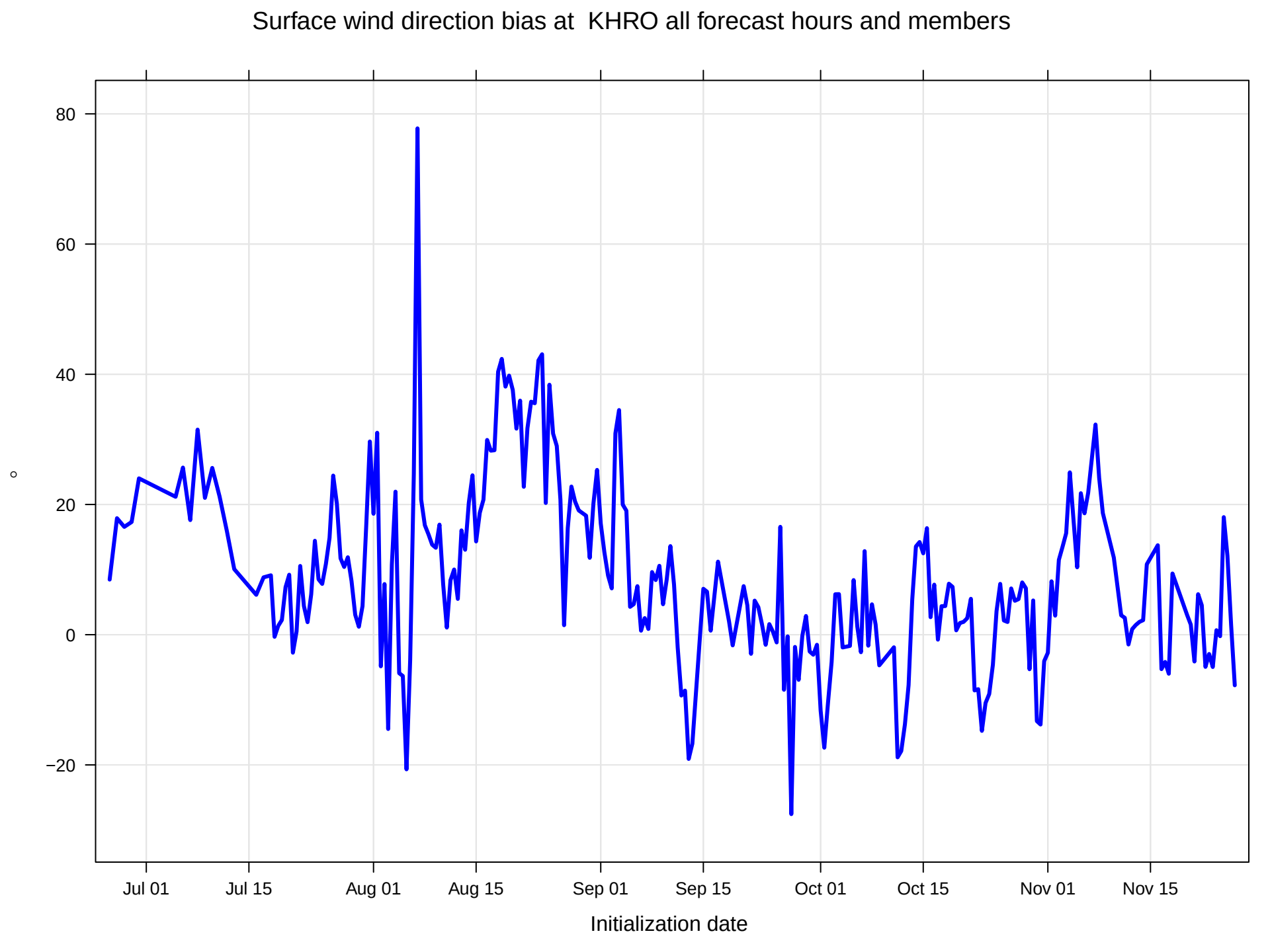

Surface wind speed bias KHRO
m/s
0.0
0.2
0.4
0.6
0.8
1.0
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

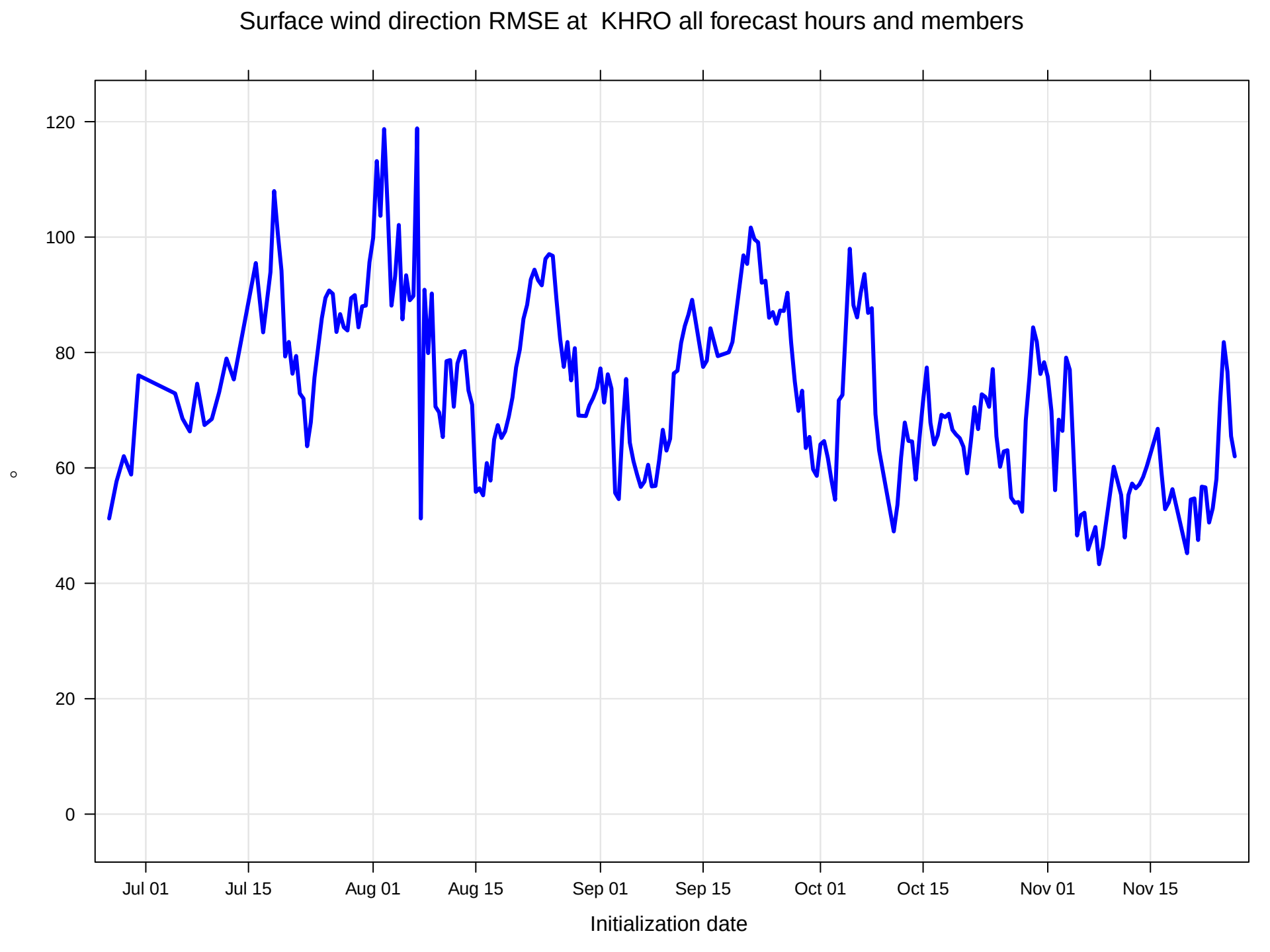

Surface direction bias KHRO
m/s
14
12
10
8
6
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

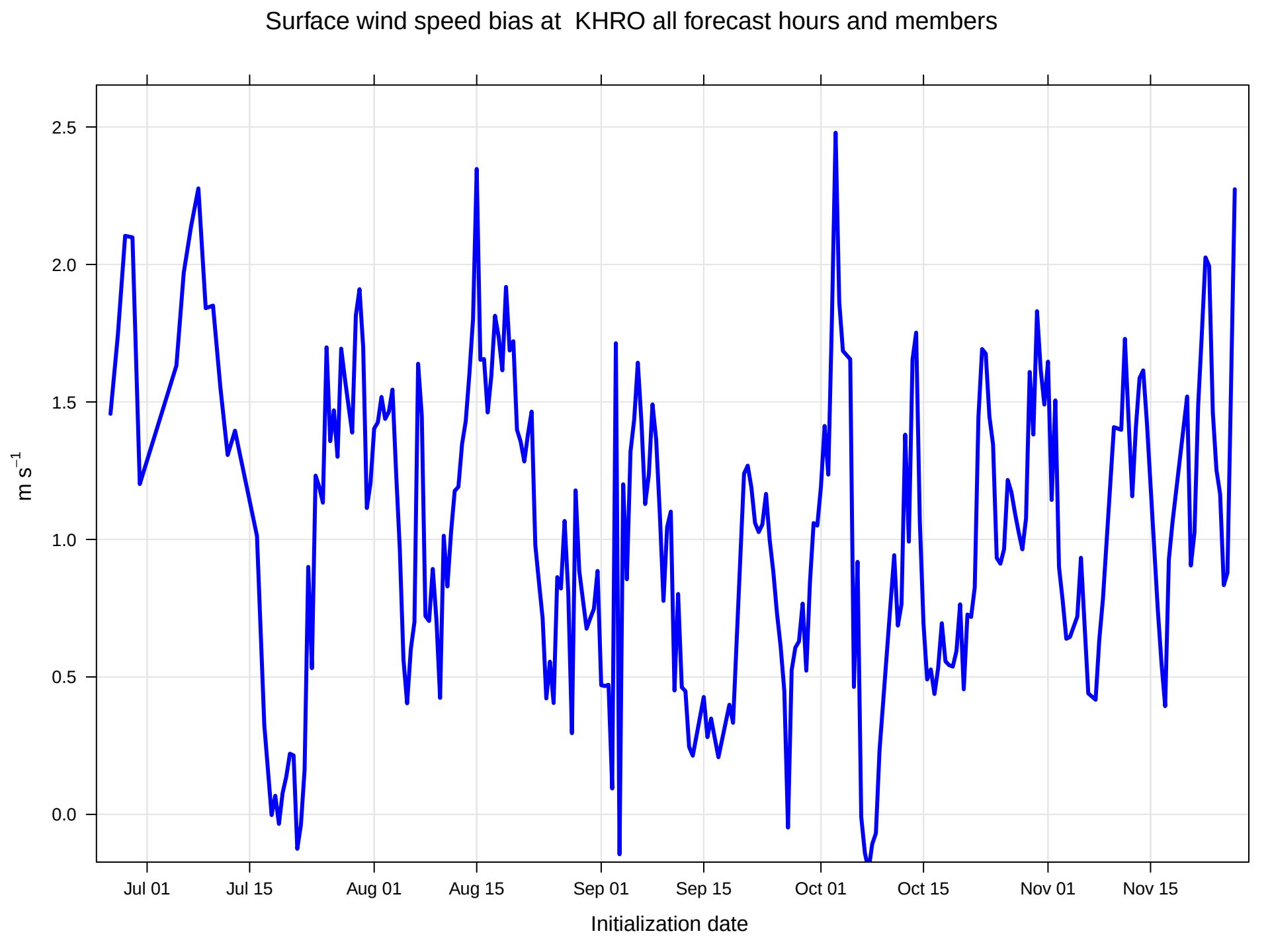

Surface vector wind vector RMSE KHRO
m/s
0
1
2
3
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

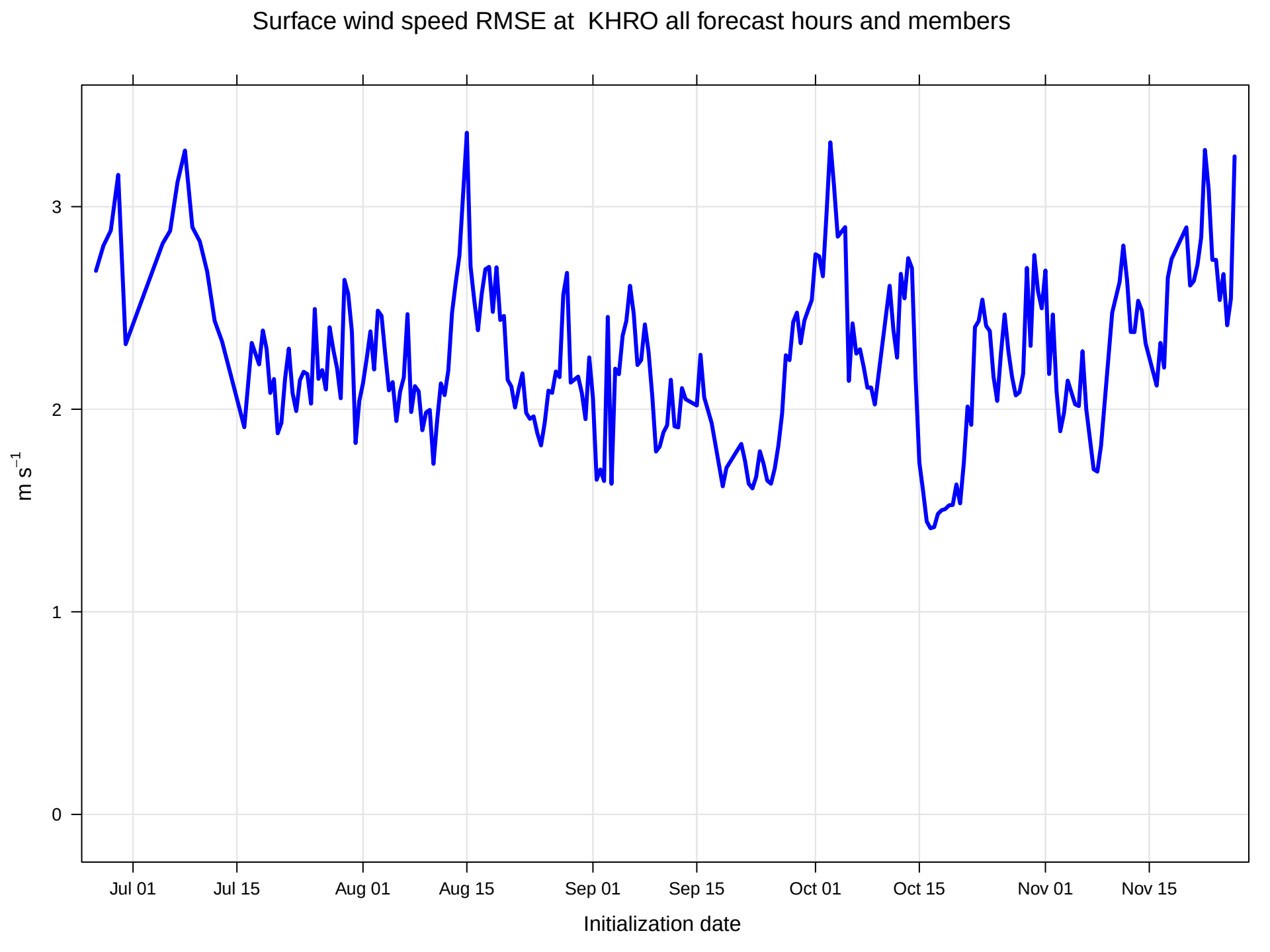

Surface wind speed RMSE KHRO
m/s
0.0
0.5
1.0
1.5
2.0
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

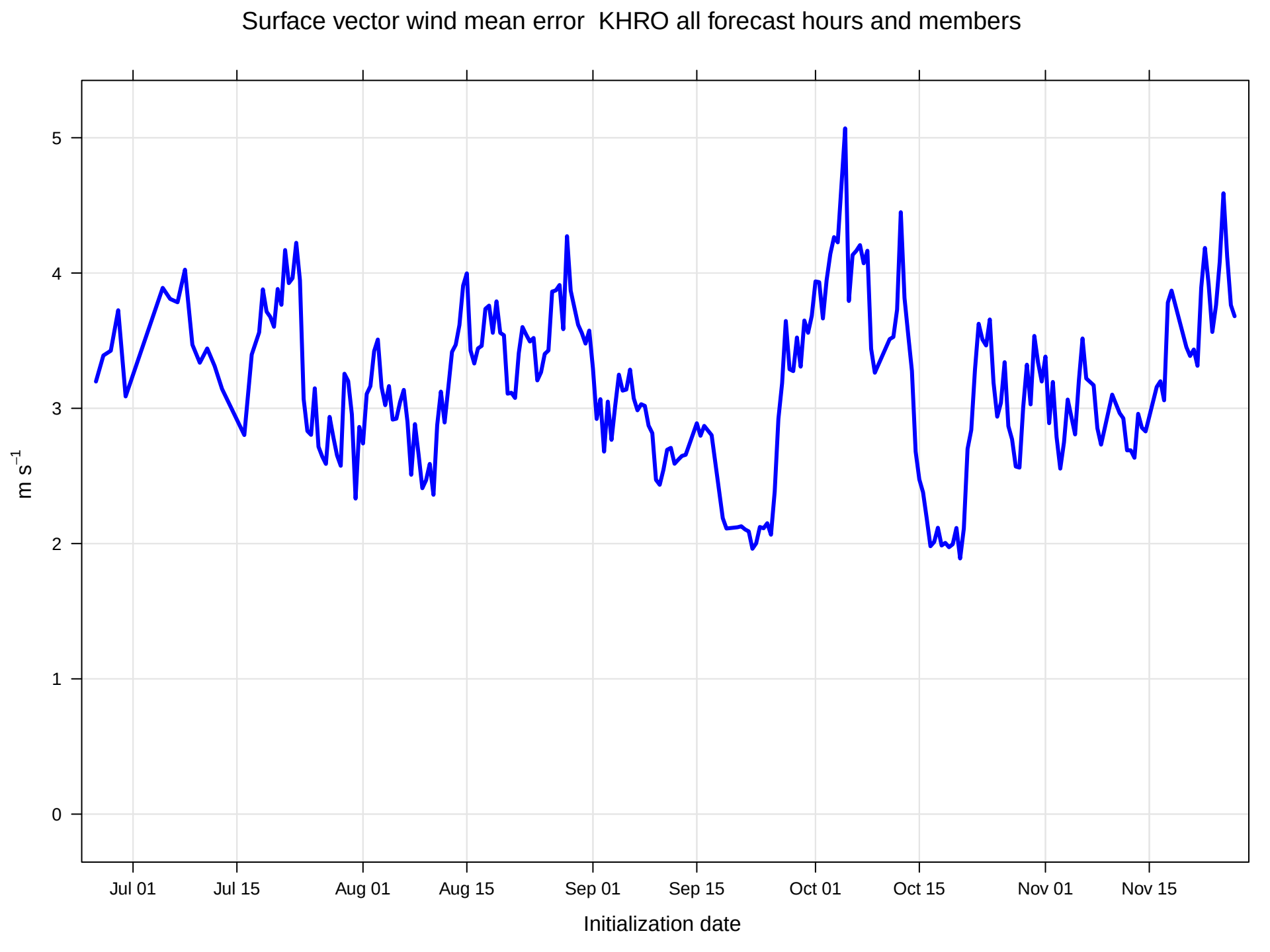

Surface direction RMSE KHRO
degrees
0
20
40
60
80
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

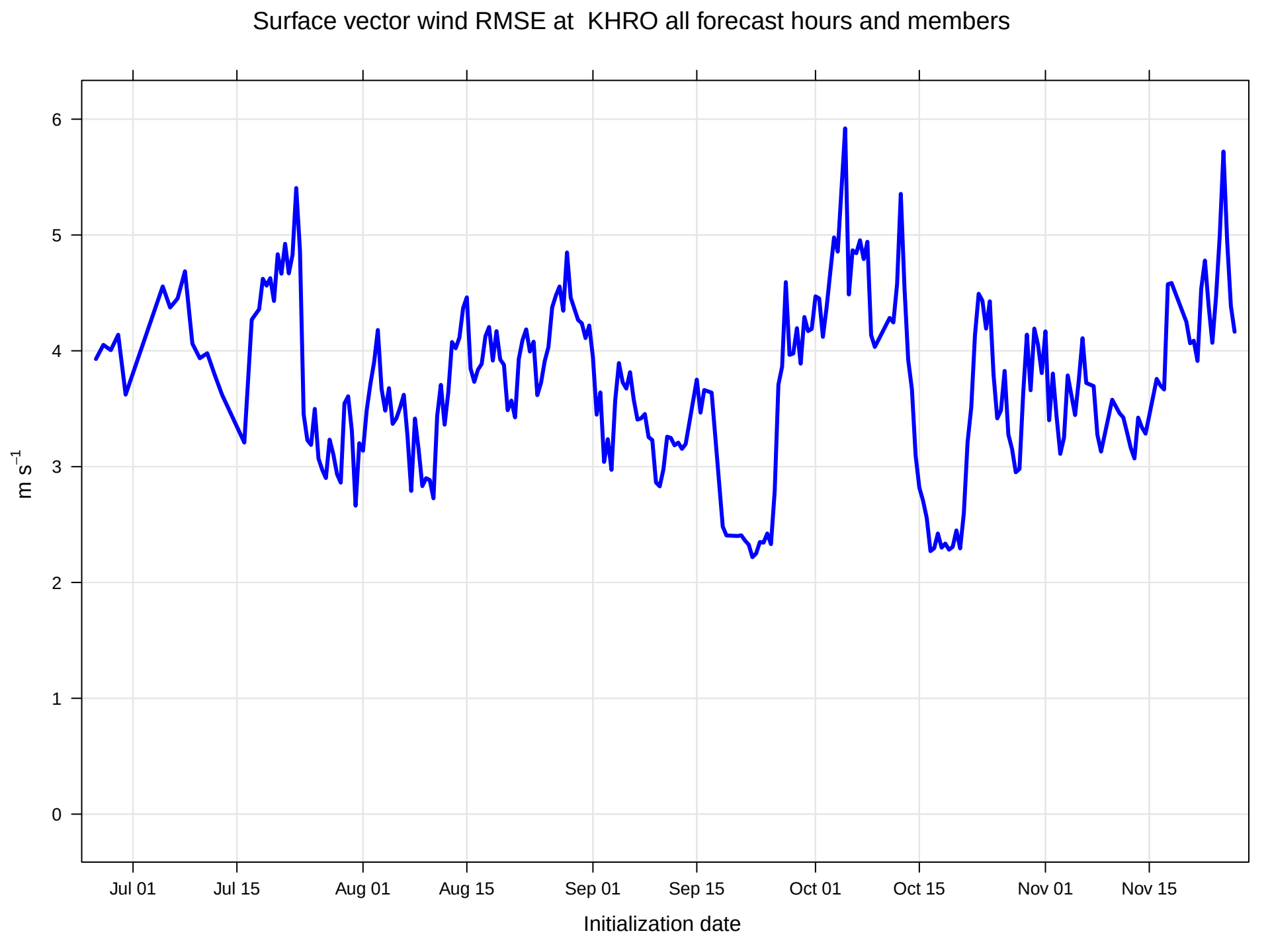

Surface wind direction bias at KHRO all forecast hours and members
80
60
40
20
0
−20
°
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

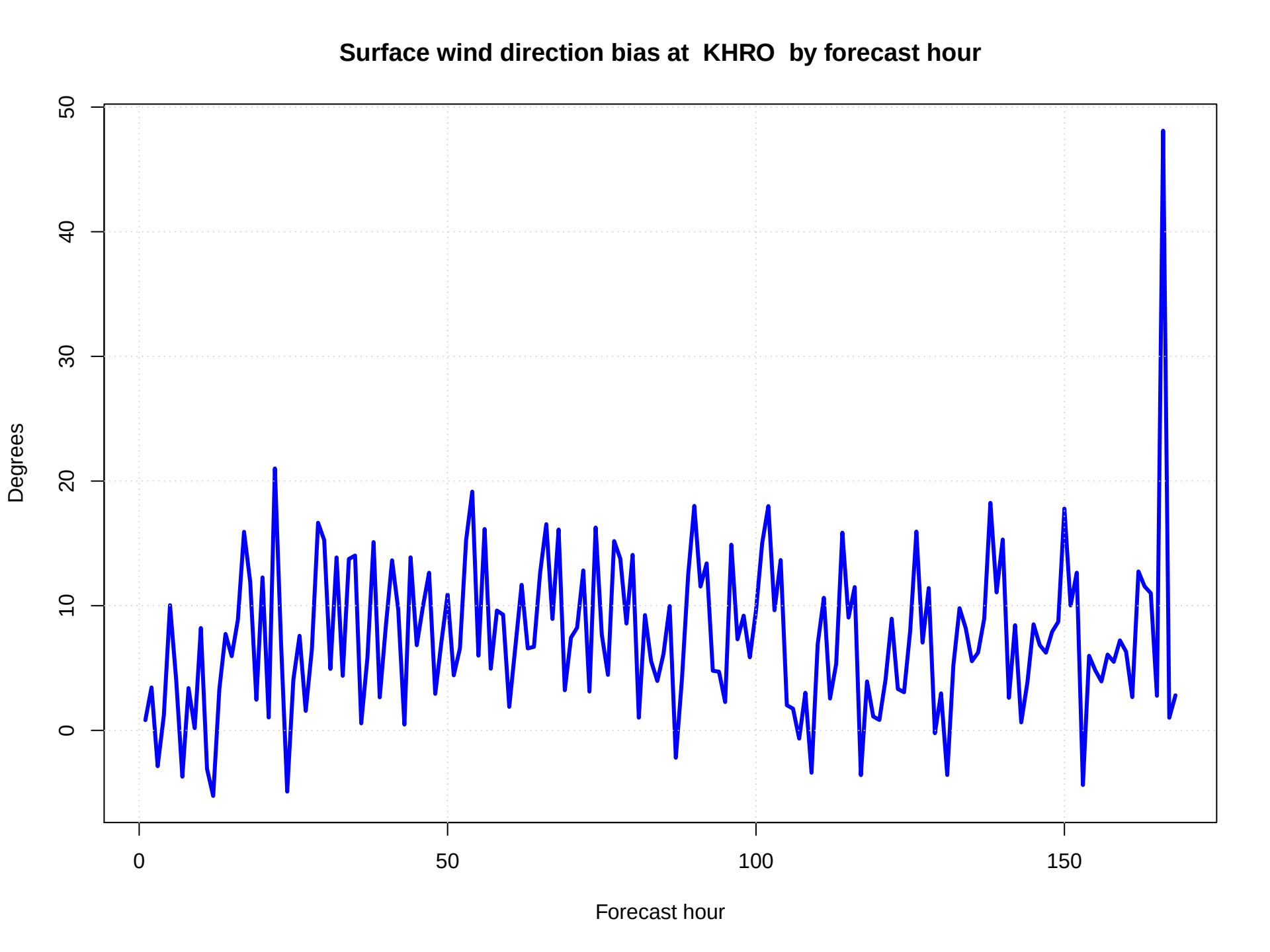

Surface wind direction RMSE at KHRO all forecast hours and members
120
100
80
60
40
20
0
°
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

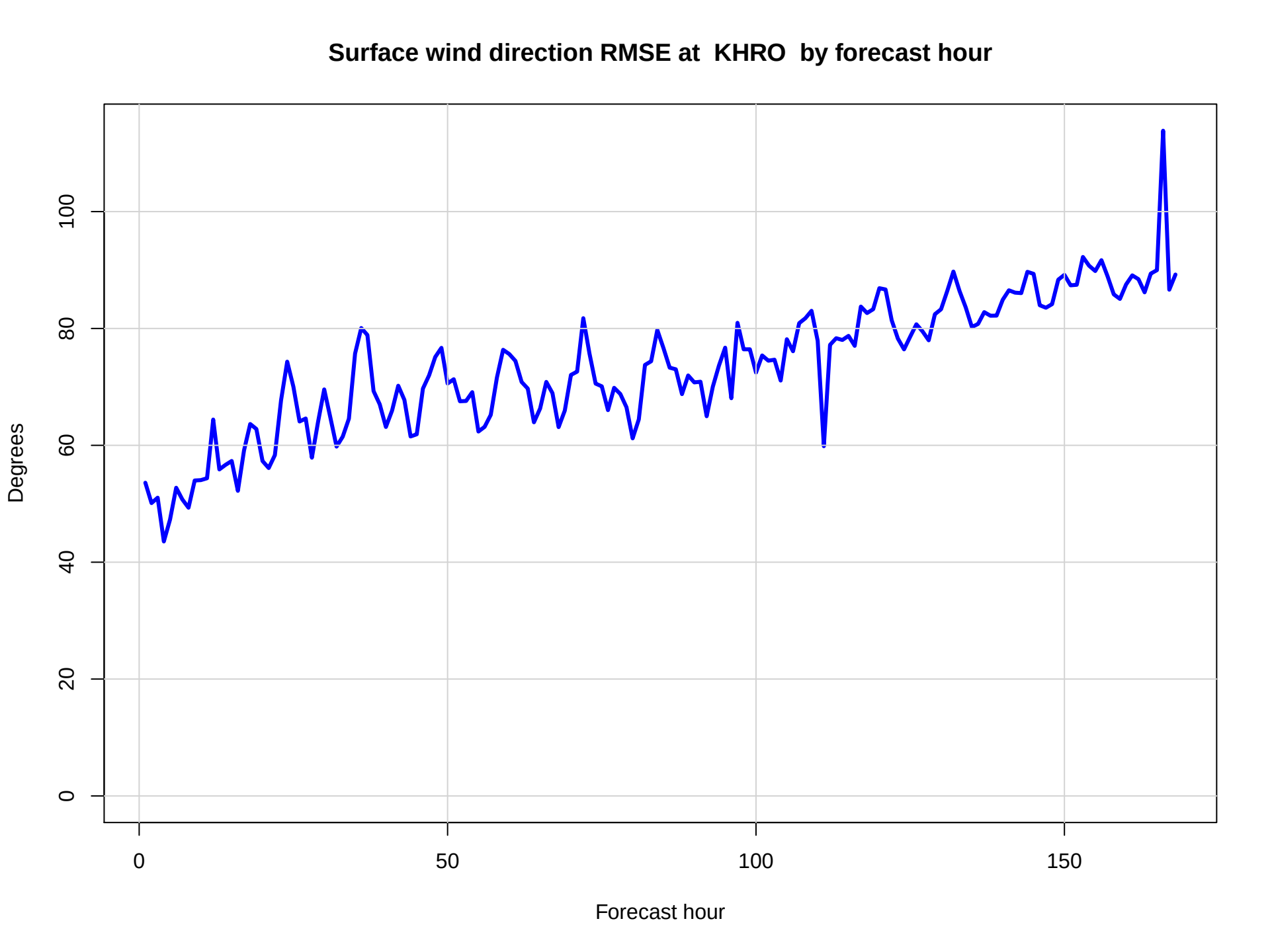

Surface wind speed bias at KHRO all forecast hours and members
2.5
2.0
1.5
1.0
0.5
0.0
m s$^{-1}$
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

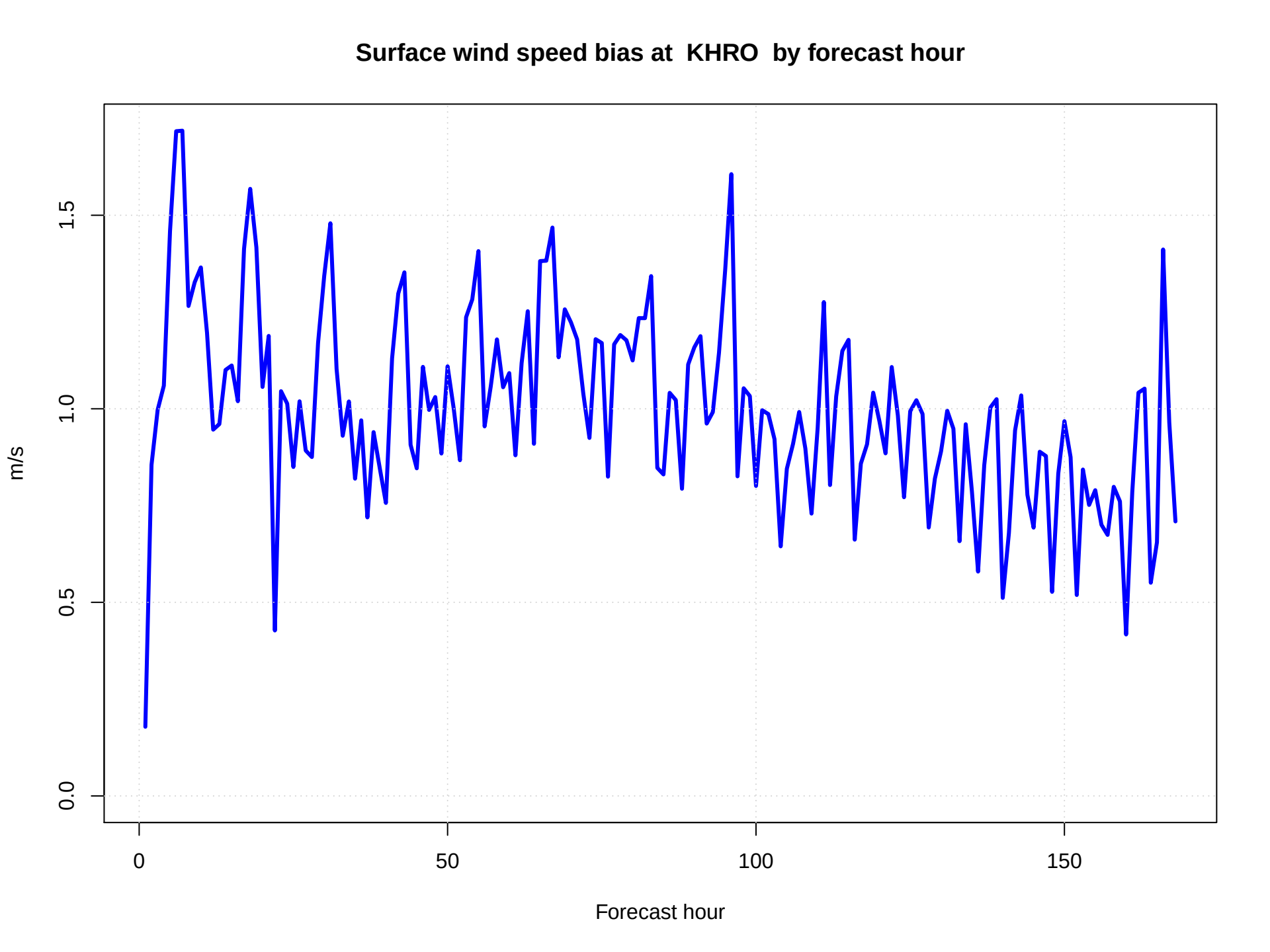

Surface wind speed RMSE at KHRO all forecast hours and members
m s$^{-1}$
0
1
2
3
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

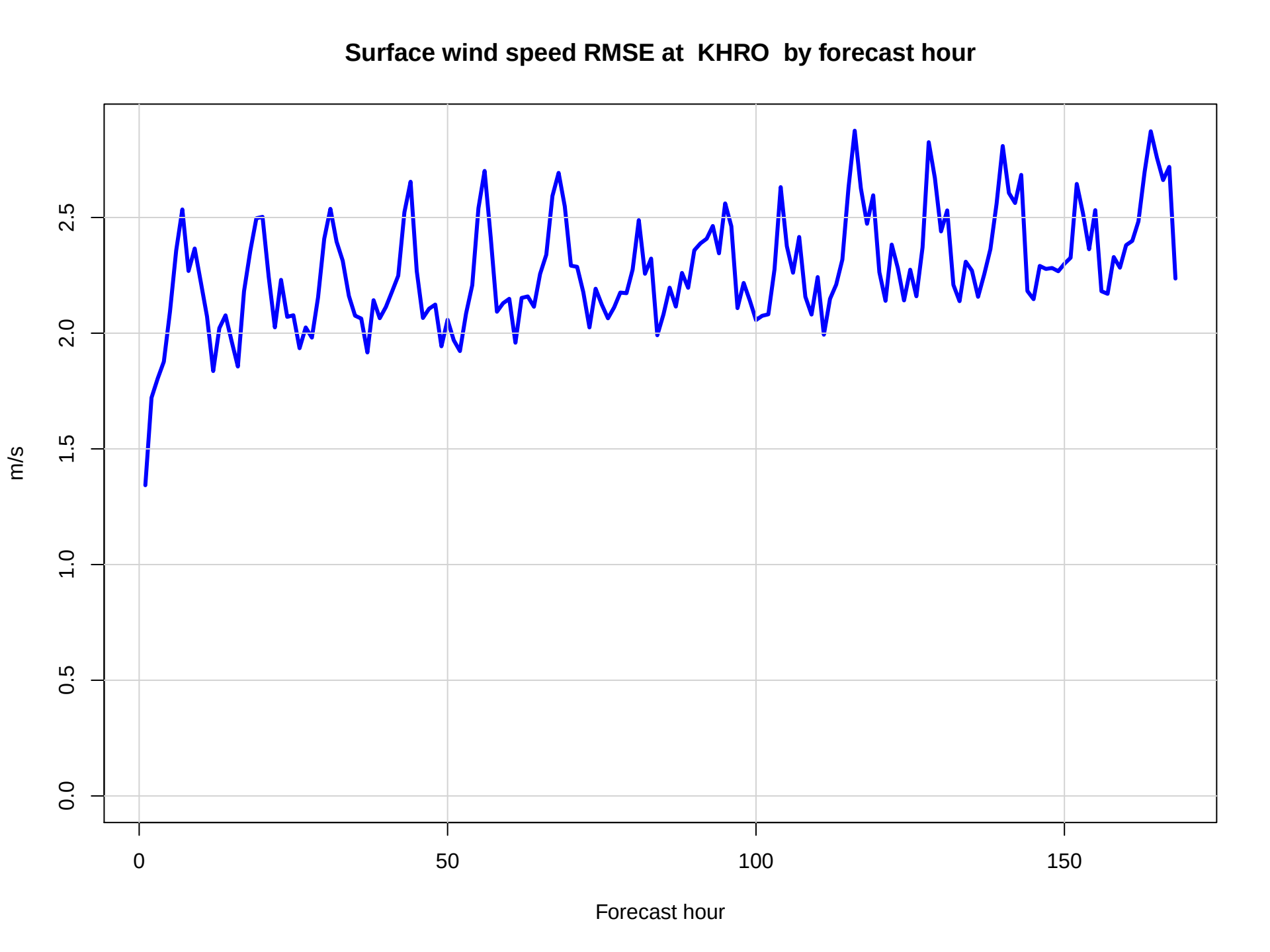

Surface vector wind mean error KHRO all forecast hours and members
m s$^{-1}$
0
1
2
3
4
5
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

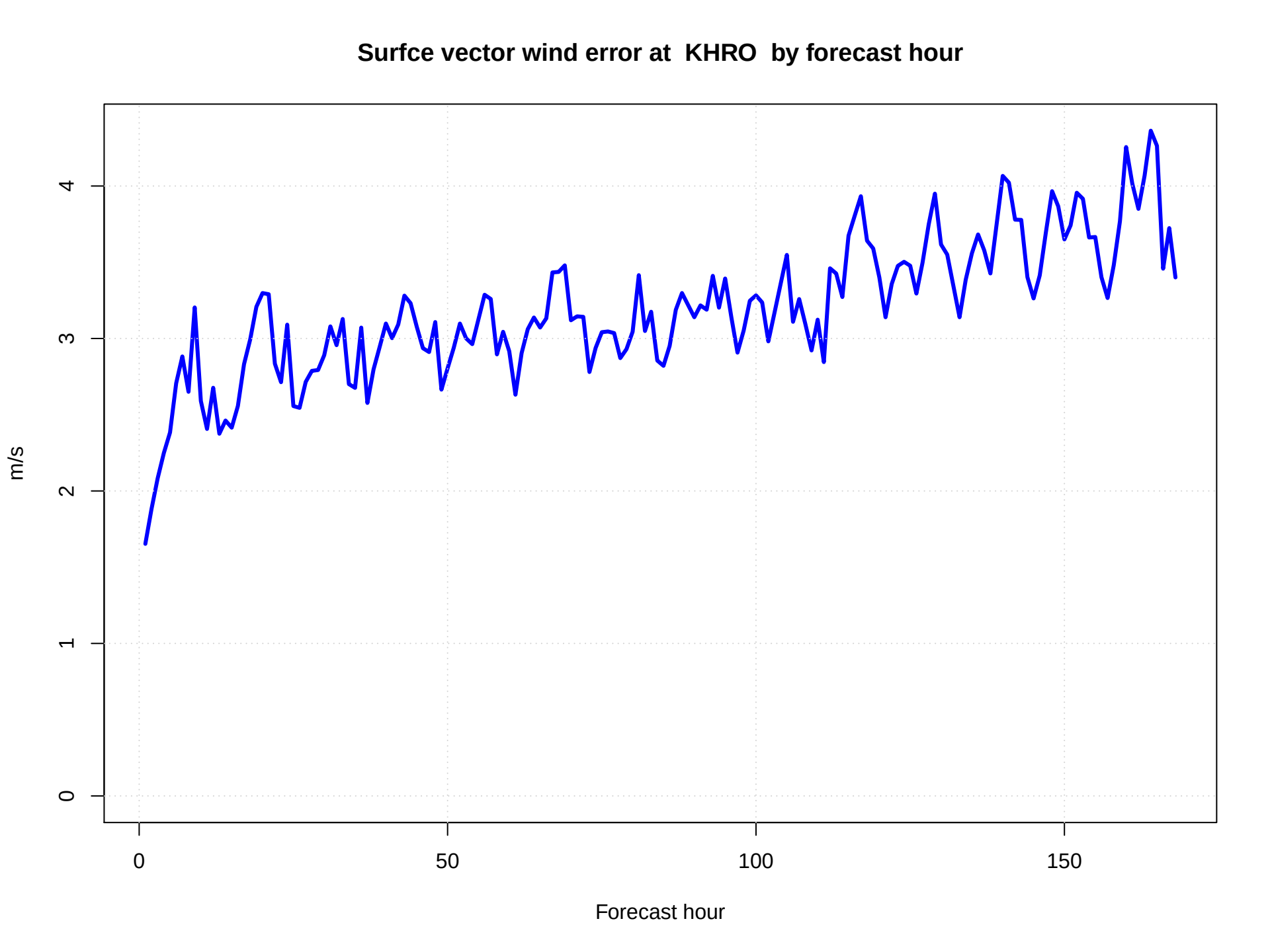

Surface vector wind RMSE at KHRO all forecast hours and members
m s$^{-1}$
0
1
2
3
4
5
6
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

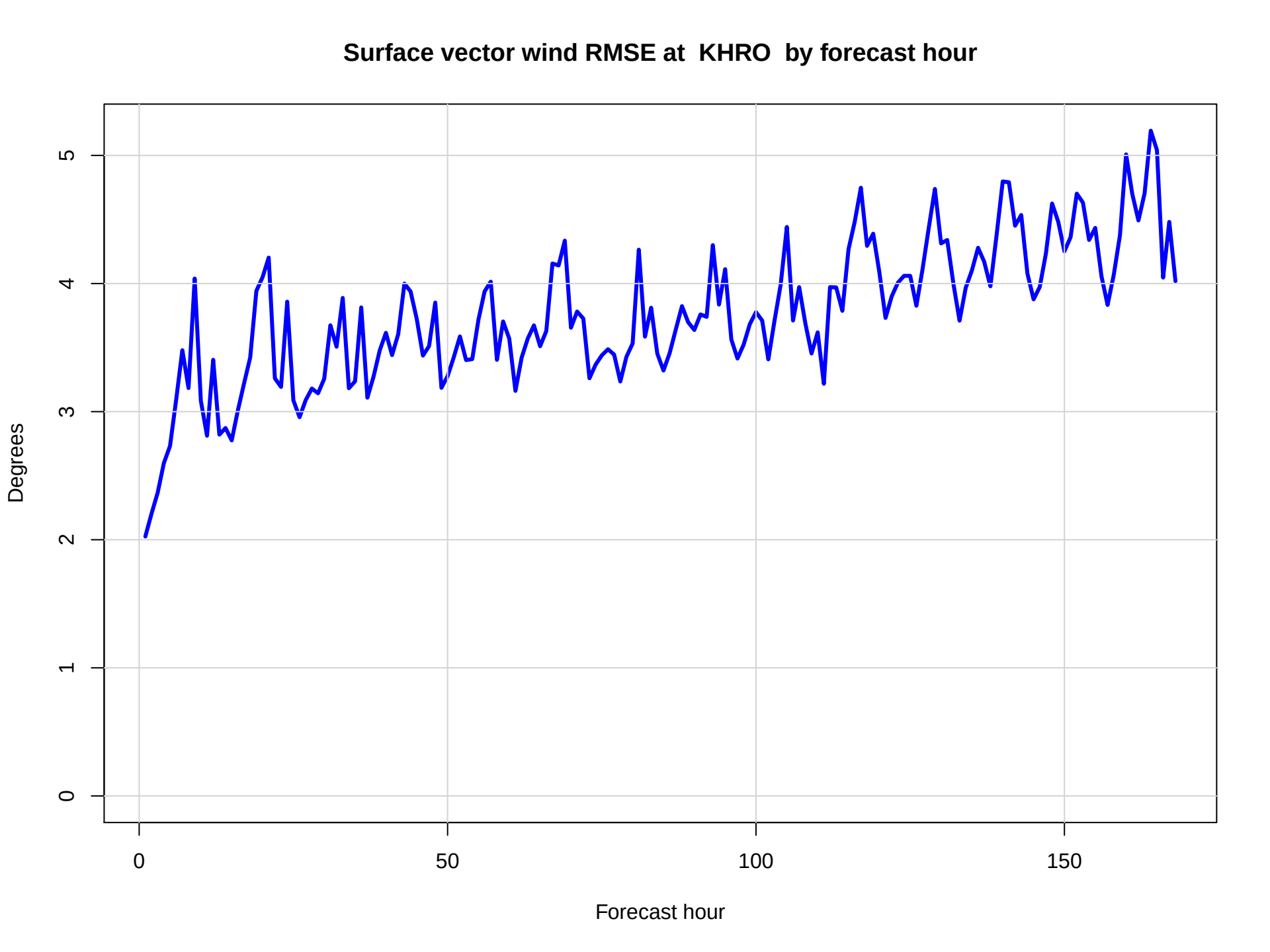

Surface wind direction bias at KHRO by forecast hour
Degrees
0
10
20
30
40
50
0
50
100
150
Forecast hour

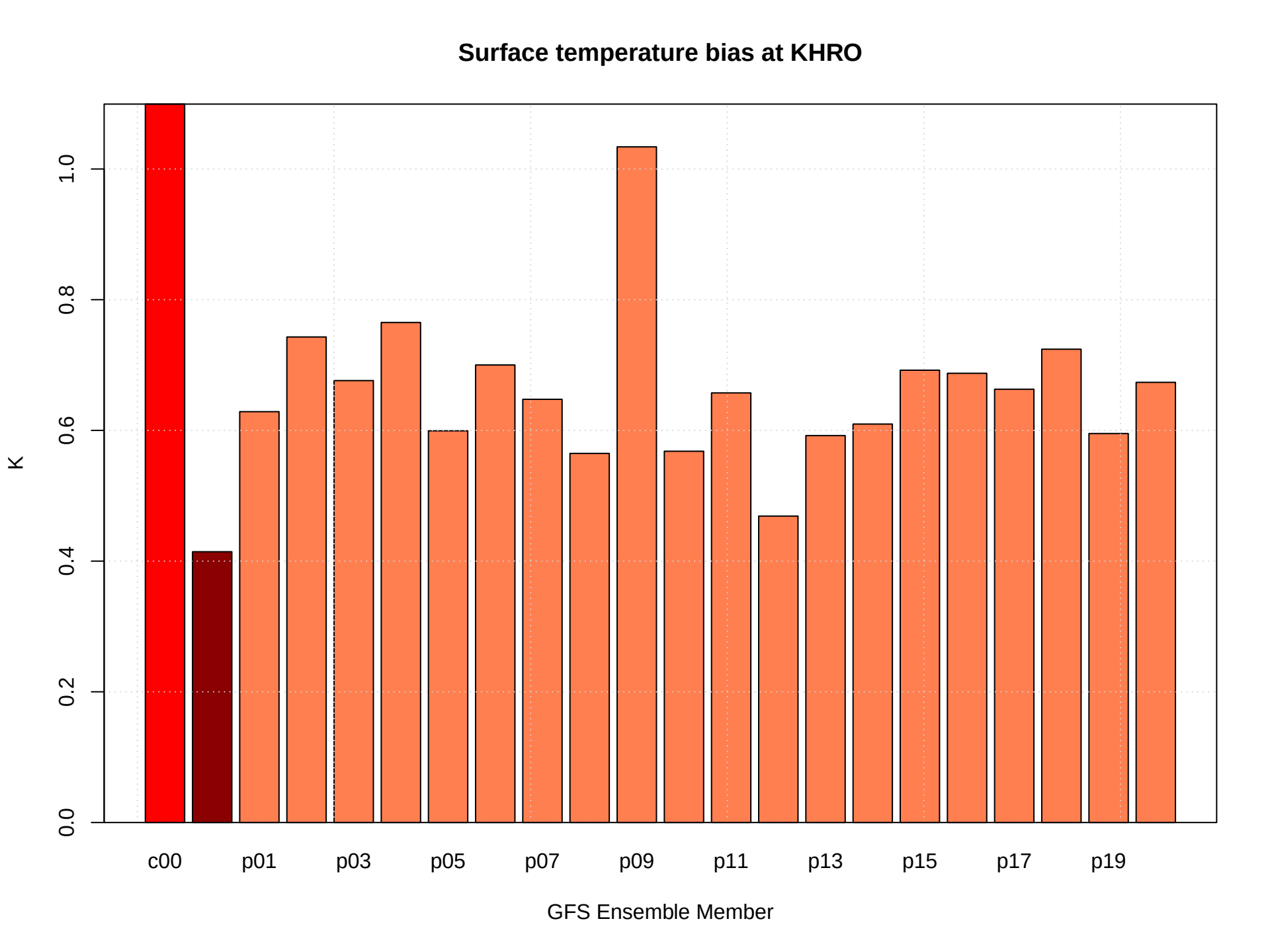

Surface wind direction RMSE at KHRO by forecast hour
Degrees
0
20
40
60
80
100
0
50
100
150
Forecast hour

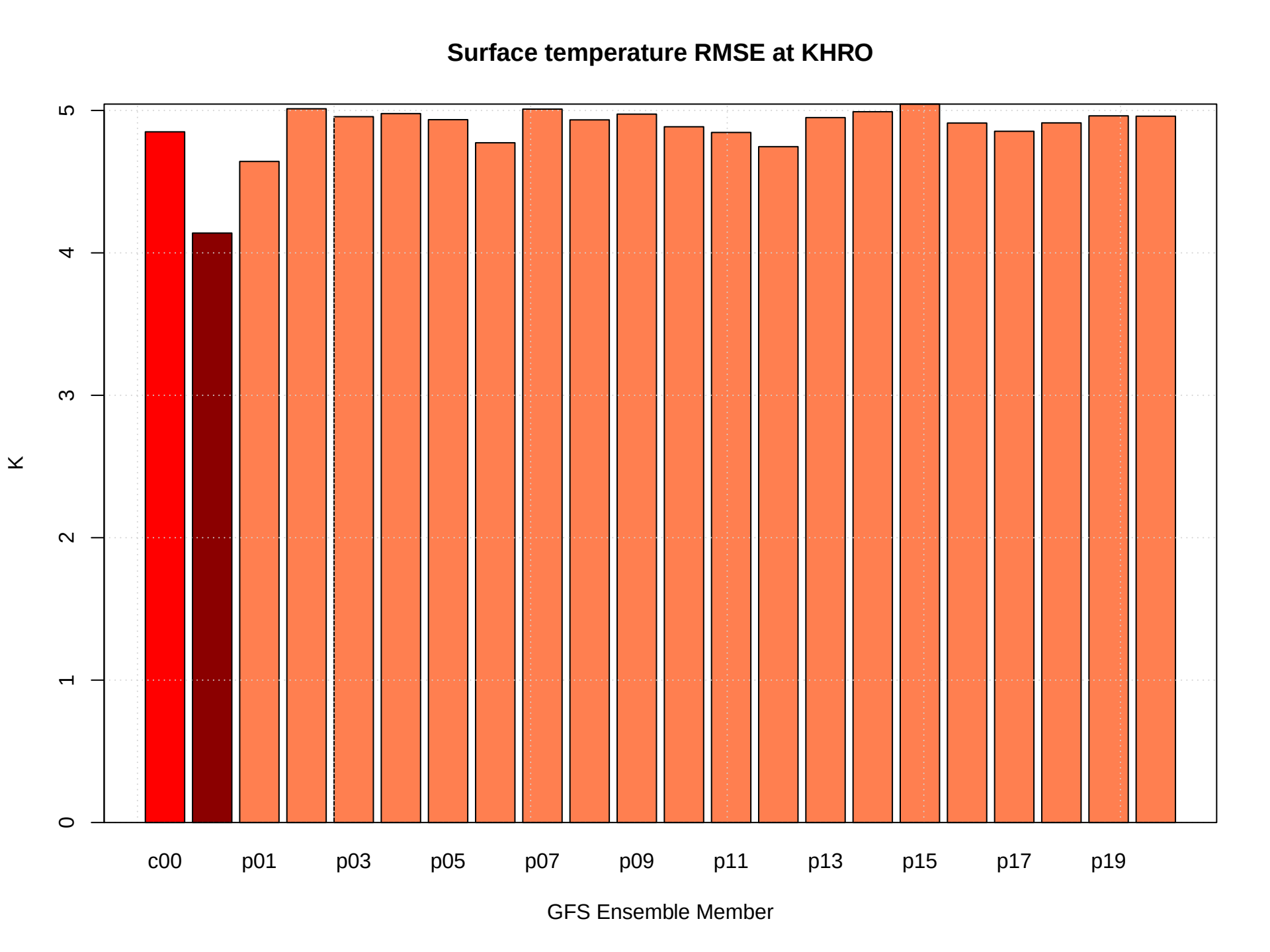

Surface wind speed bias at KHRO by forecast hour
m/s
0.0
0.5
1.0
1.5
0
50
100
150
Forecast hour

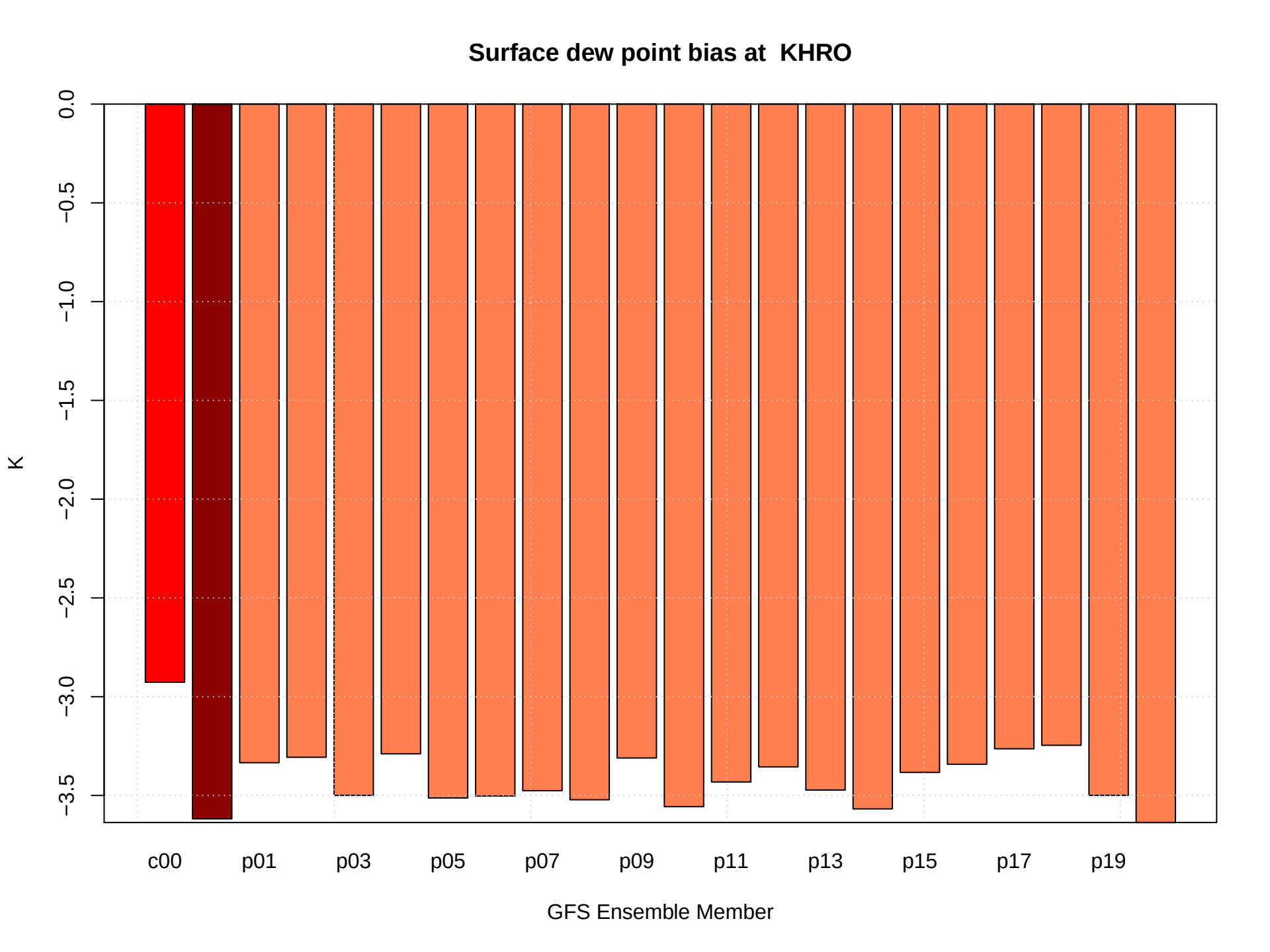

Surface wind speed RMSE at KHRO by forecast hour
m/s
0.0
0.5
1.0
1.5
2.0
2.5
0
50
100
150
Forecast hour

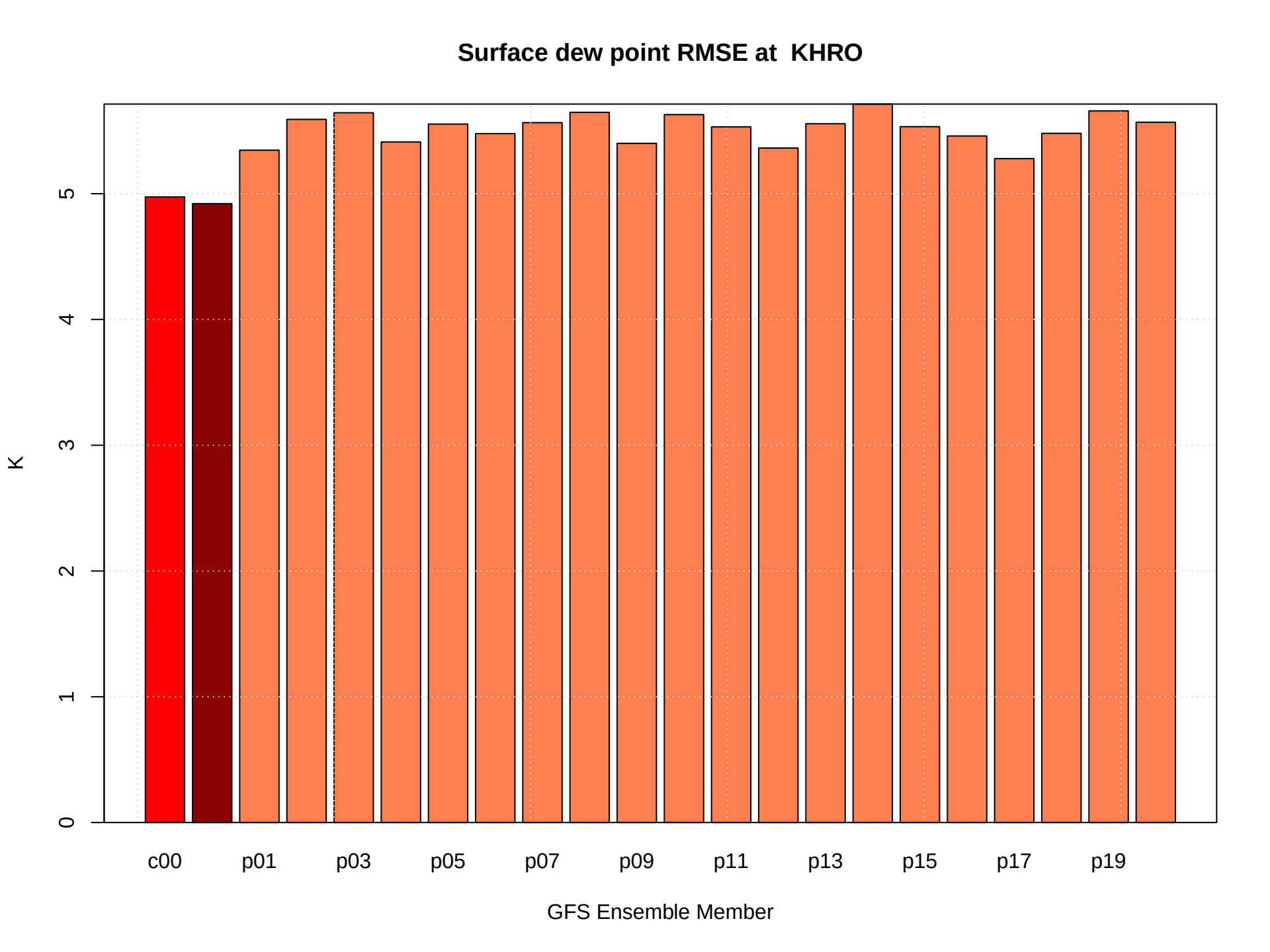

Surfce vector wind error at KHRO by forecast hour
m/s
0
1
2
3
4
0
50
100
150
Forecast hour

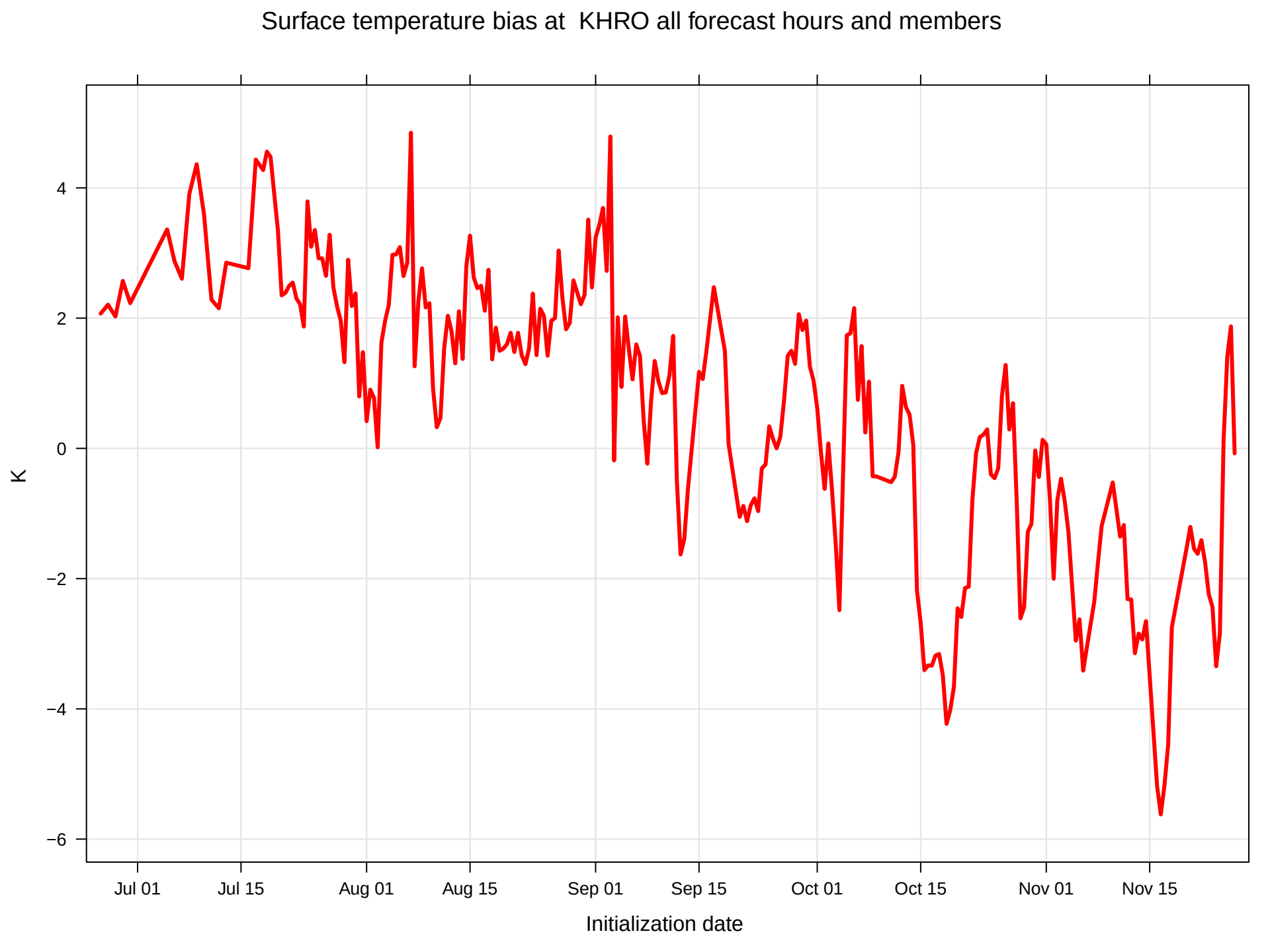

Surface vector wind RMSE at KHRO by forecast hour
Degrees
0
1
2
3
4
5
0
50
100
150
Forecast hour

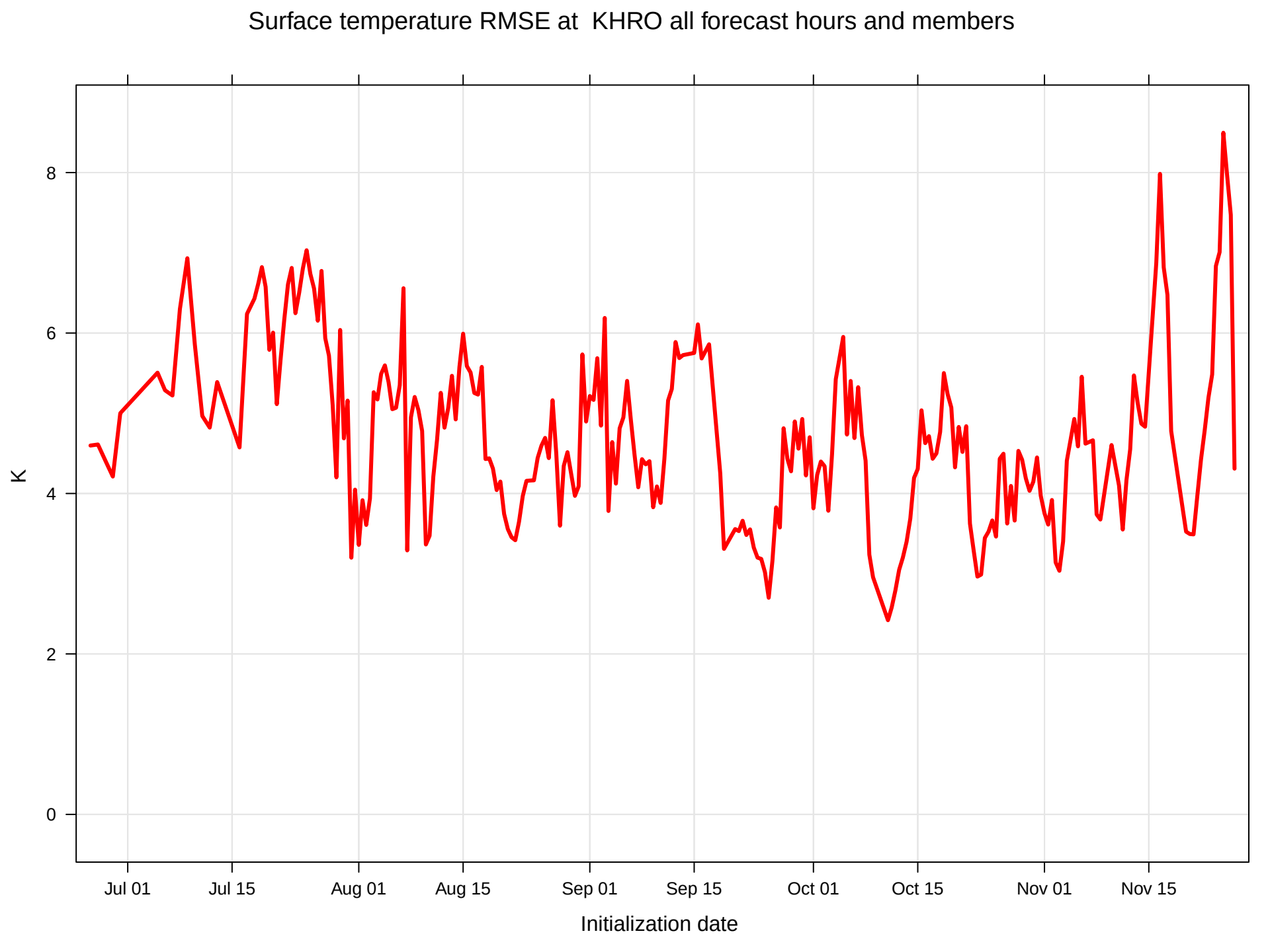

Surface temperature bias at KHRO
K
0.0
0.2
0.4
0.6
0.8
1.0
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

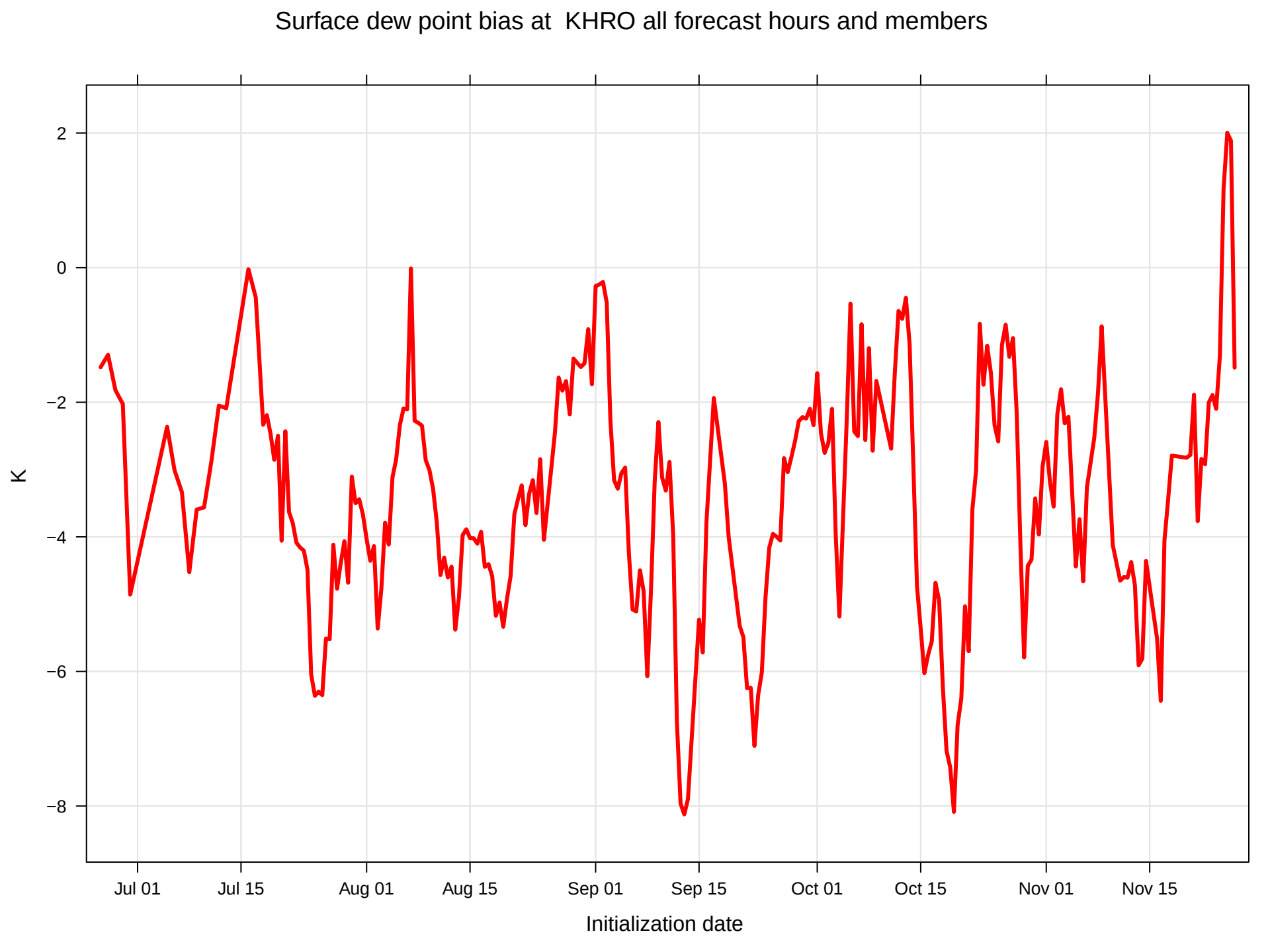

Surface temperature RMSE at KHRO
K
0
1
2
3
4
5
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

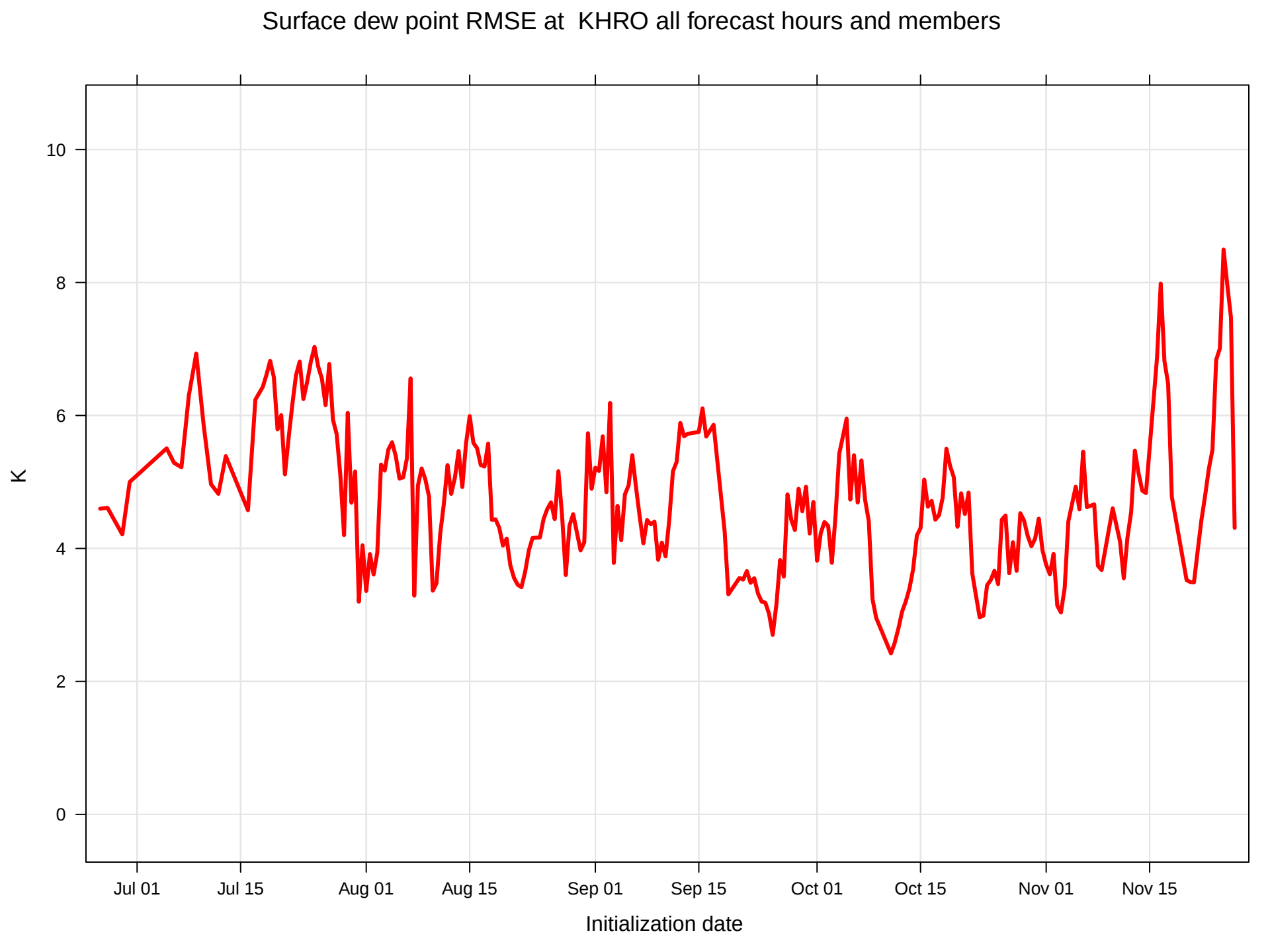

Surface dew point bias at KHRO
0.0
−0.5
−1.0
−1.5
−2.0
−2.5
−3.0
−3.5
K
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

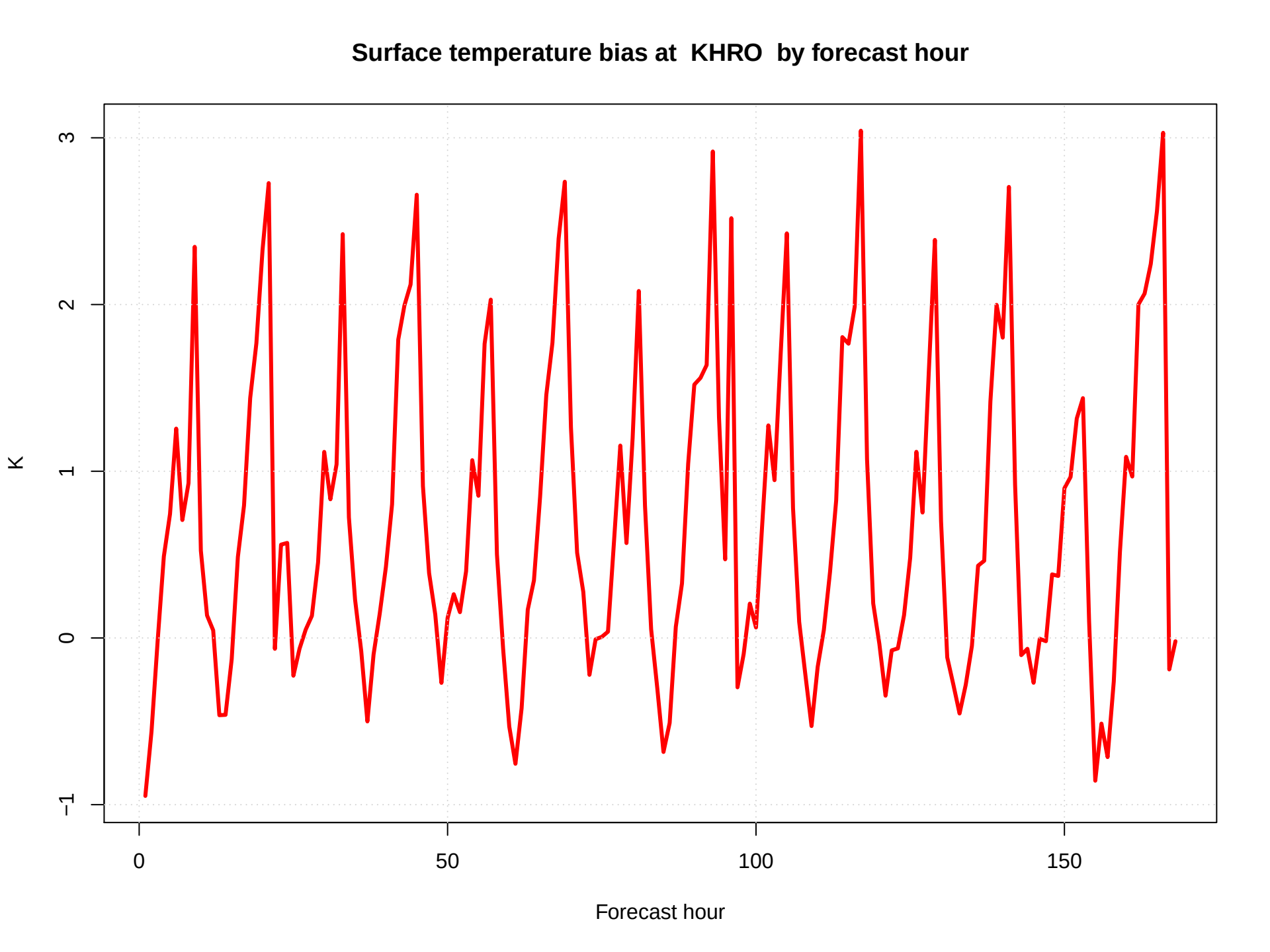

Surface dew point RMSE at KHRO
K
0
1
2
3
4
5
c00
p01
p03
p05
p07
p09
p11
p13
p15
p17
p19
GFS Ensemble Member

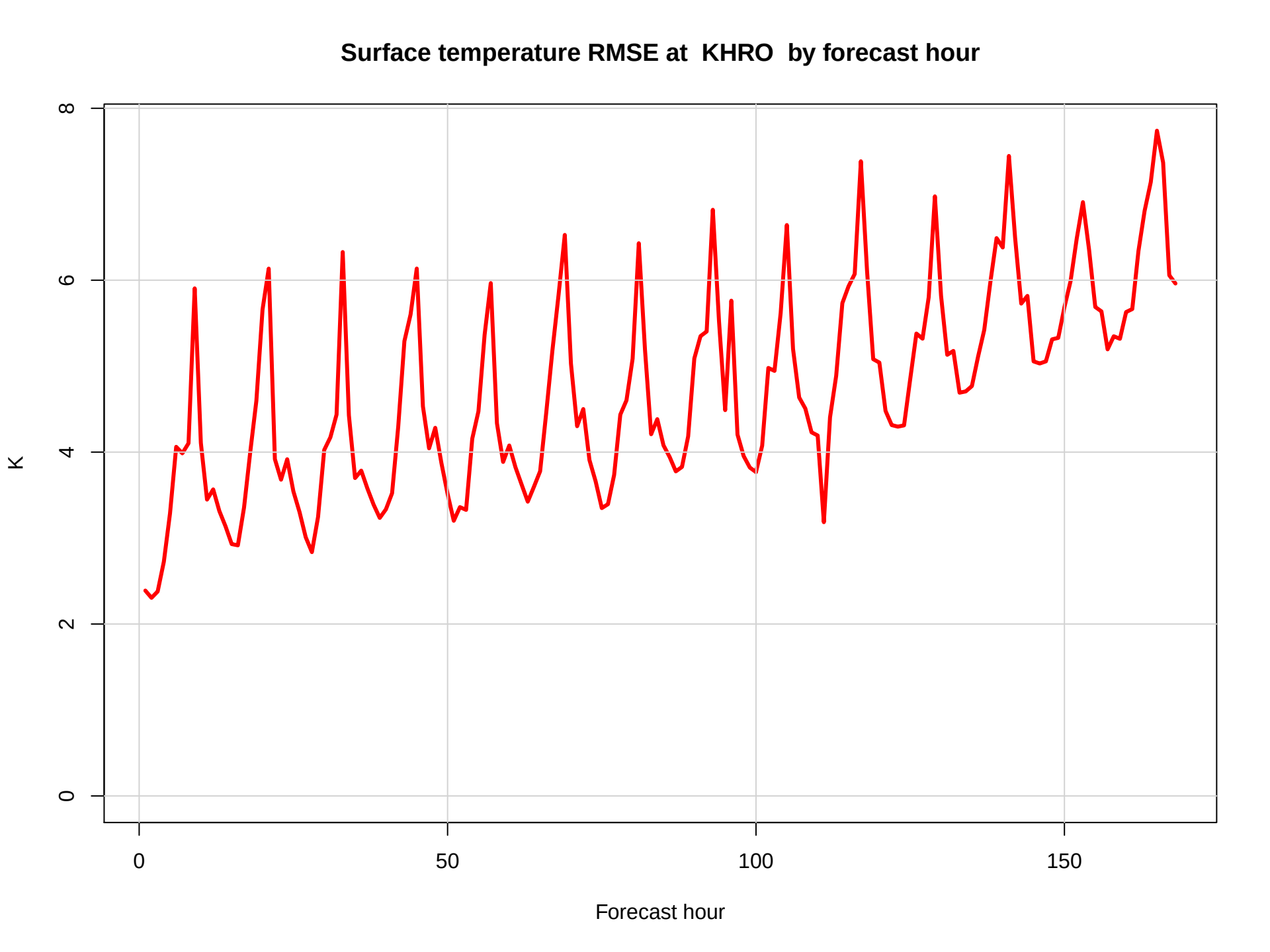

Surface temperature bias at KHRO all forecast hours and members
K
4
2
0
−2
−4
−6
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

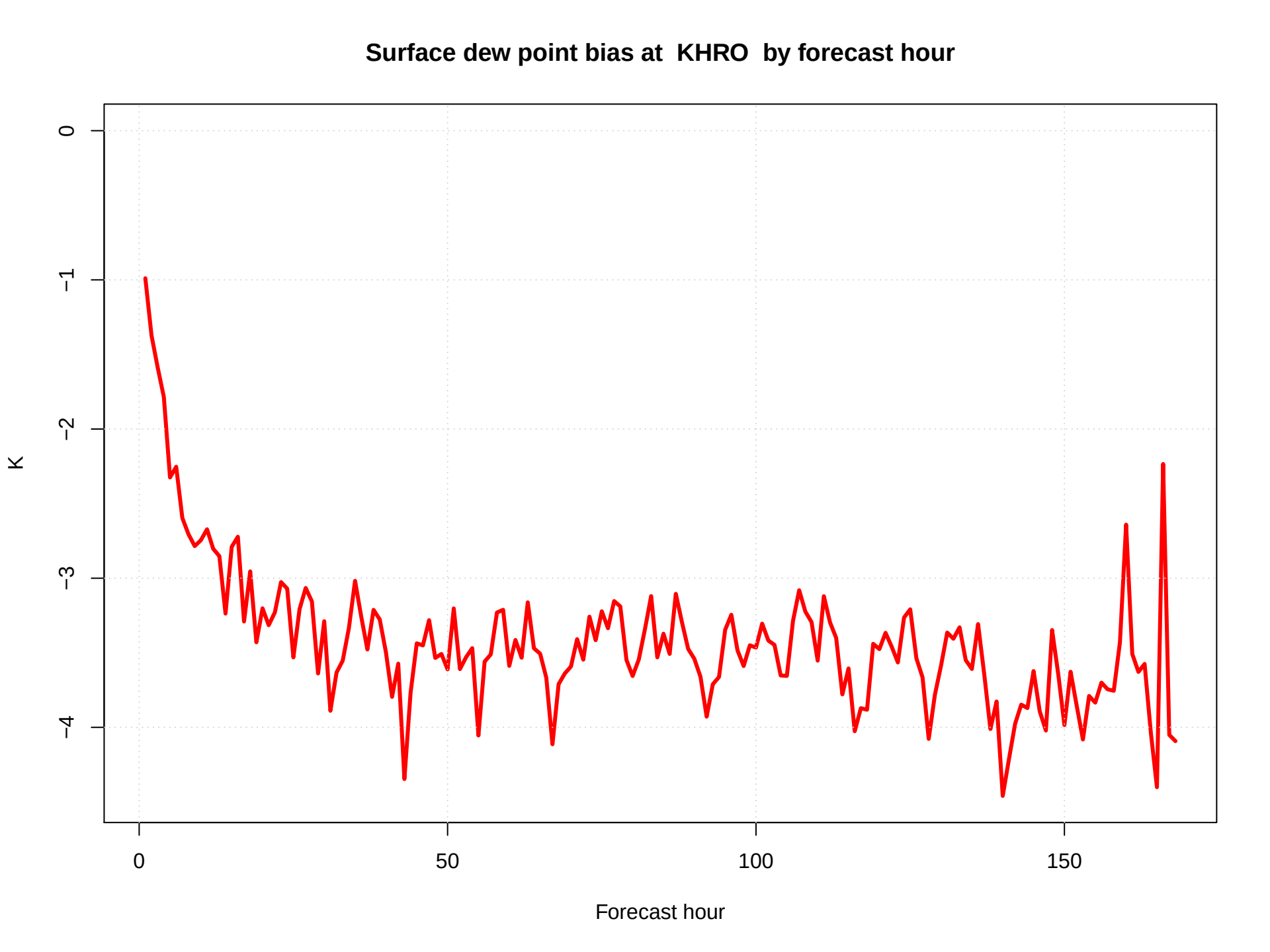

Surface temperature RMSE at KHRO all forecast hours and members
K
0
2
4
6
8
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date

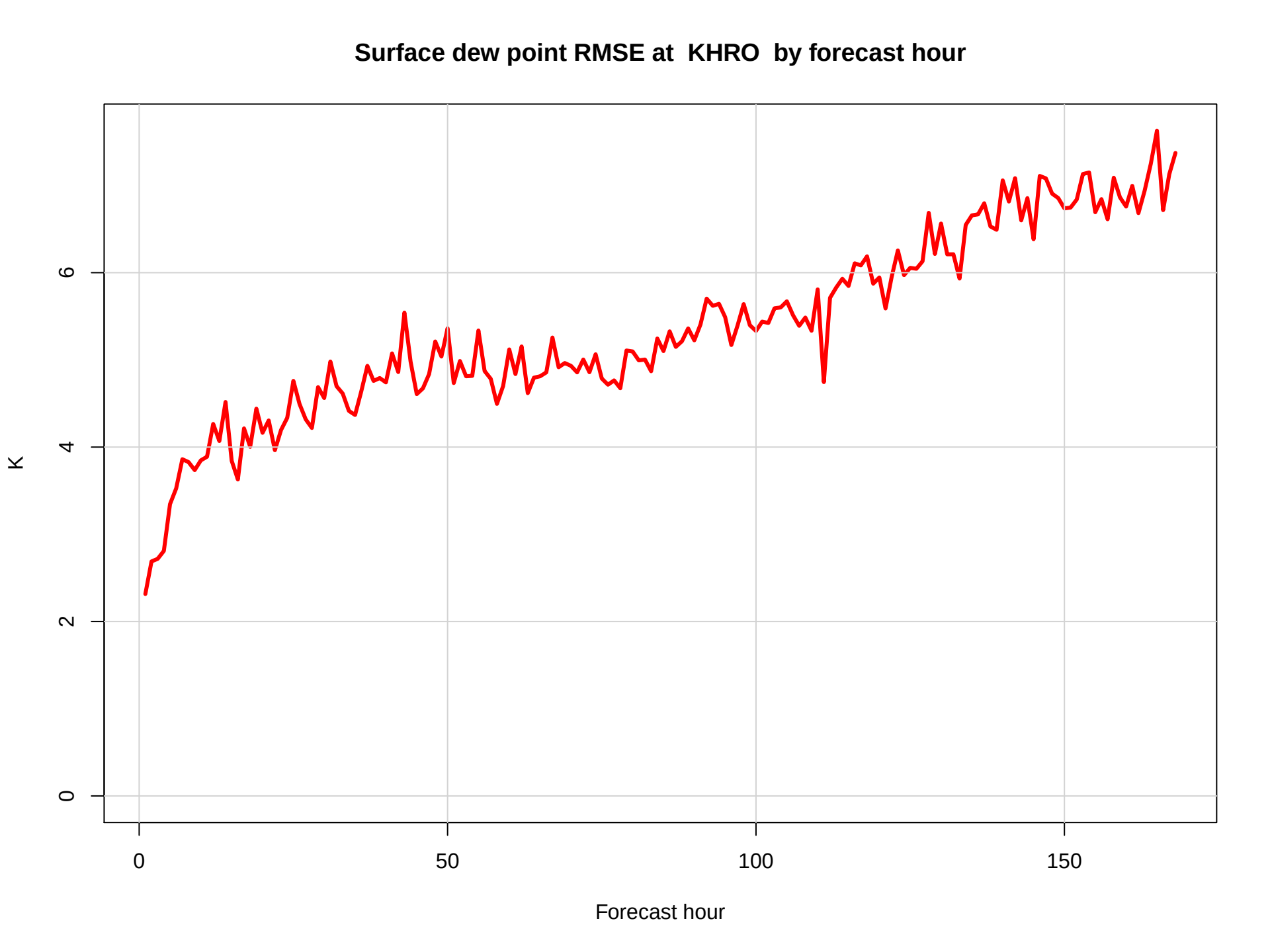

Surface dew point bias at KHRO all forecast hours and members
2
0
−2
−4
−6
−8
K
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date


Surface dew point RMSE at KHRO all forecast hours and members
K
10
8
6
4
2
0
Jul 01
Jul 15
Aug 01
Aug 15
Sep 01
Sep 15
Oct 01
Oct 15
Nov 01
Nov 15
Initialization date


Surface temperature bias at KHRO by forecast hour
K
3
2
1
0
−1
0
50
100
150
Forecast hour


Surface temperature RMSE at KHRO by forecast hour
K
0
2
4
6
8
0
50
100
150
Forecast hour


Surface dew point bias at KHRO by forecast hour
0
−1
−2
−3
−4
K
0
50
100
150
Forecast hour


Surface dew point RMSE at KHRO by forecast hour
K
0
2
4
6
0
50
100
150
Forecast hour